EXPANDED SITE INSPECTION REPORT

FOR

COOPER SCHOOL SITE

WESTLAND, MICHIGAN

U.S. EPA ID: MID981189905

NOVEMBER 3, 1995

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SIGNATURE PAGE

FOR

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1. INTRODUCTION

Approval was given to the Michigan Department of Natural Resources (MDNR) by the United States Environmental Protection Agency (U.S. EPA) to conduct an Expanded Site Inspection (ESI) of the Cooper School site.

The site was initially discovered to CERCLIS by the MDNR in 1988. The MDNR prepared the preliminary assessment (PA) on April 8, 1988 and conducted a Screening Site Inspection (SSI) on March 23, 1989. The report for the SSI was completed on September 11, 1990.

After it was determined that the SSI had underestimated the extent of the Cooper School site contamination area, the Environmental Response Division, Livonia District Office and the Cooper School Community Information Committee (CIC) requested that the U.S. EPA allow the MDNR Pre-Remedial Group to conduct an ESI at the site. This request was made in spite of the SSI conclusion to declare the site No Further Remedial Action Planned (NFRAP) in the Superfund process. The U.S. EPA agreed that better information was needed about the site before a NFRAP decision could be made. An ESI was therefore conducted during the spring and summer of 1993. The ESI included meetings with the CIC, a review of the Livonia District Office files, a reconnaissance inspection of the site, completion of an electromagnetometer survey, installation and sampling of Geoprobe monitoring wells, collection of soil, leachate, surface water and sediment samples, and evaluation of onsite soil borings.

The purposes of an ESI have been stated by the U.S. EPA in a directive outlining Pre-Remedial Program strategies. The directive states:

The ESI will address all the data requirements of the revised HRS using field screening and NPL level DQOs. It may also provide needed data in a format to support remedial investigation work plan development. Only sites that appear to score high enough for listing and that have not been deferred to another authority will receive an ESI (U.S.EPA 1988).

2. SITE BACKGROUND

2.1 Introduction

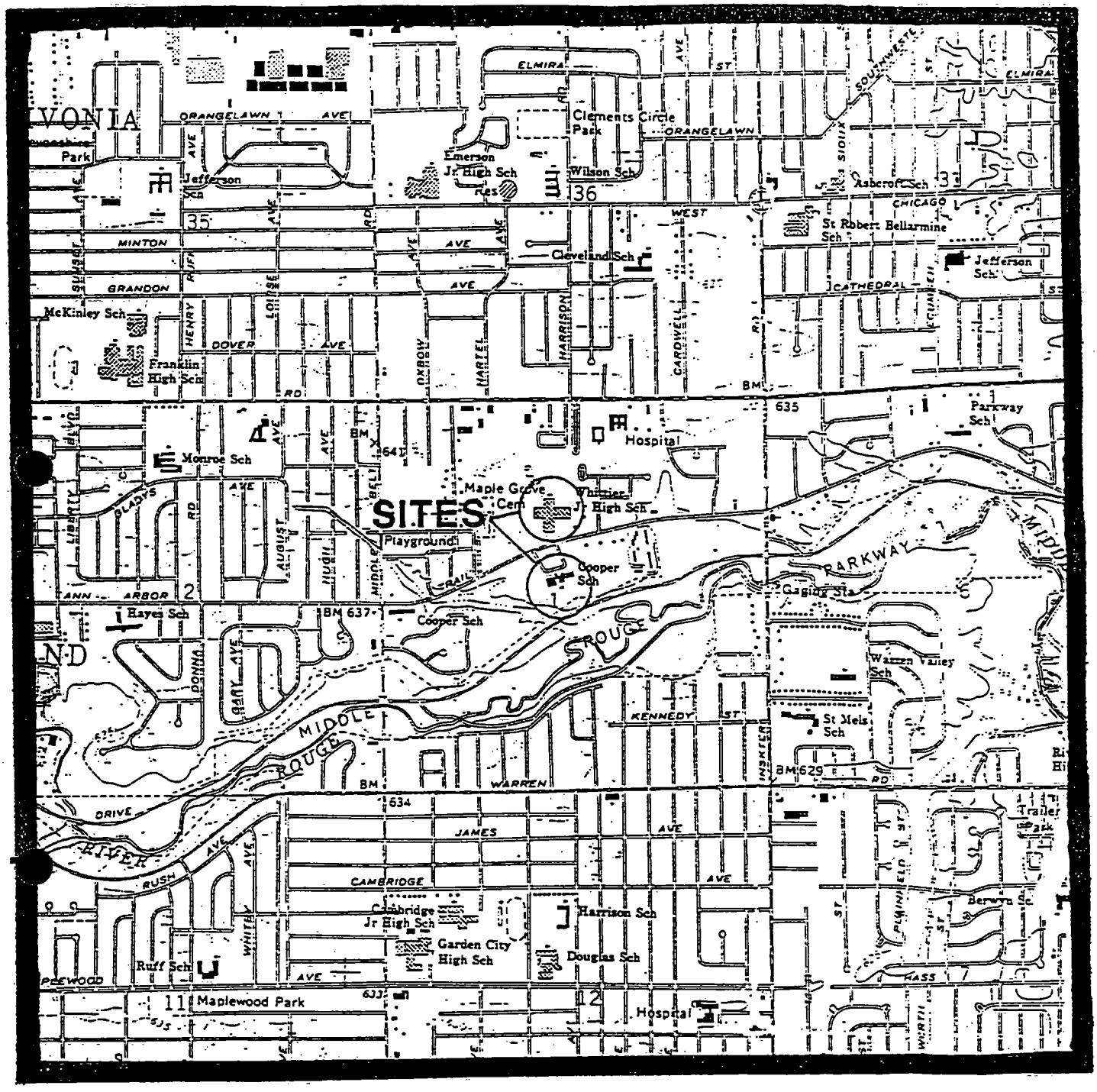
This section includes information obtained from the ESI work plan preparation, review of Livonia District Office site files, and the site reconnaissance. Information collected and reported during the SSI will not be repeated in this report. Only additional information or information necessary to correct the SSI will be presented in the ESI report.

2.2 Site Description

The Cooper School site is a former elementary school which was built on a municipal waste landfill in 1962. The site is located at 28611 Ann Arbor Trail in the City of Westland in southeast Michigan, Wayne County. The site is approximately 80 acres and is located entirely within Section 1 of Livonia Township, T01S, R09E. A site location map is presented in Figure 2-1. The 4-mile radius map of the Cooper School site is provided in Appendix A. The 15-mile Surface Water Target Distance Limit map for the site is provided in Appendix B.

The landfill operated from approximately 1925 until 1952. A map of the existing site features as they are currently understood is presented in Figure 2-2. The SSI identified an approximately eight acre area along Ann Arbor Trail, including the location of the school building, as the site. Aerial photographs confirmed that this area was part of the landfill, but that the fill area extended south to the current right-of-way of Hines Drive. An additional amount of fill was deposited in an area south of

FIGURE 2-1
SITE LOCATION



COOPER AND WHITTIER SCHOOLS

LIVONIA PUBLIC SCHOOLS

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

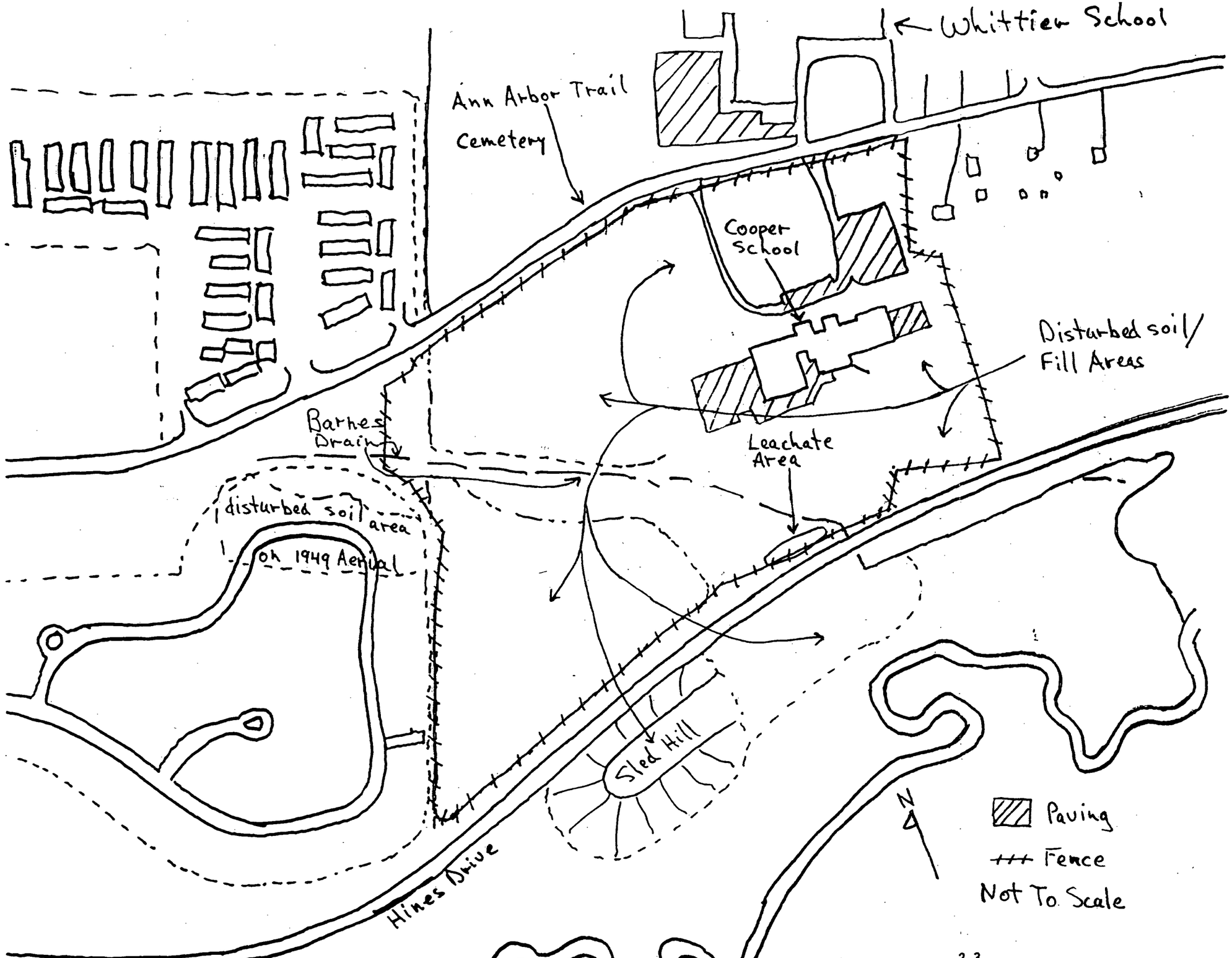
NORTH

MICHIGAN

QUADRANGLE LOCATION

CONTOUR INTERVAL 5 FEET

FIGURE 2-2
EXISTING SITE FEATURES



Hines Drive in the Wayne County Parks Middle Rouge Parkway apparently as a sledding hill. The entire Cooper School property is fenced and the school is abandoned.

A leachate outbreak exists at the south side of the Cooper School property approximately 50 feet west of the emergence of Barnes Drain which passes through the property in a cement culvert. The flow from the outbreak joins the drain flow which passes beneath Hines Drive and flows east then south to discharge into the Middle Rouge River.

The site is situated on surficial sand and gravel deposits underlain by approximately 60 feet of brown to gray dense clay. The bedrock which underlies the glacial deposits in this area consists of the Antrim shale formation. The near surface geology in this area has been greatly altered by city construction. Much of the soil surface has been reworked and filled with sands and gravels, various topsoils, and construction debris.

2.3 Site History

As stated above, the area of the landfill is considerably larger than first reported. Discovery letters sent by the Livonia District Office to various parties has revealed that in addition to general waste, incinerator ash from the City of Detroit and construction debris may have been deposited at the site. At the time the school was constructed, waste appeared to have been dug out and redeposited on the southwest fill area of the property.

Since the SSI, additional studies have been conducted at the site. The SSI recommended that the EPA Emergency Branch evaluate PNA and pesticide results for a possible removal action. EPA reviewed the data and refused

to take action. In June, 1991, the Livonia Public Schools conducted limited soil borings at the Cooper School and Whittier School (located north of Ann Arbor Trail directly across from Cooper School) properties. Mixed results were obtained. Heavy metals were detected in most samples with some relatively high levels of silver and aluminum being detected on the Whittier School property and some elevated levels of cyanide and pesticides on the Cooper School property. The American Toxic Substance Disease Registry (ATSDR) reviewed these data and concluded that no further construction should occur at the north side of the Whittier property until further sampling had been conducted. ATSDR did not issue an advisory against further property use, however.

In August, 1992, MDNR conducted soil borings on the Cooper School property and in the front yards of several houses in the subdivision west of the property. No contaminants were detected in the yards at concentrations above background levels. Waste was encountered on the Cooper School property and elevated levels of metals, particularly lead, were detected. Samples collected from the spoil piles in front of woodchuck holes detected levels up to 12,000 mg/kg.

The Cooper School was closed and students transferred to other schools beginning with the 1992 school year. Also at the request of the MDNR, an eight foot high chain link fence was placed around the Cooper School property during July, 1991.

3. EXPANDED SITE INSPECTION PROCEDURES AND FIELD OPERATIONS

3.1 Introduction

This section outlines procedures and observations of the ESI of the Cooper School site. Individual subsections address the reconnaissance inspection and sampling procedures. Rationales for specific activities are also provided. The ESI was conducted in accordance with the U.S. EPA approved work plan.

3.2 Reconnaissance Inspection

A work plan for the site, including identification of sampling needs, was developed during the week of March 1, 1993. The plan was modified during discussions with Division geologists on March 9 and further modified after the March 11 CIC meeting. Subsequent to these meetings, a non-sampling reconnaissance inspection of the site was conducted on March 22 and 26 to complete site plans. This inspection was conducted in accordance with Michigan Department of Natural Resources Health and Safety guidelines (MDNR, 1988). The inspection included a walk-through of the site to determine appropriate health and safety requirements for conducting on-site activities and to make observations to aid in characterizing the site. Sampling locations were also determined during the inspection.

Reconnaissance Inspection Observations. The site fence was intact and not breached. The land was soggy throughout the site and expected to present difficulties in bringing vehicles on site during the ESI. The leachate outbreak was found to have a considerable flow approximately four feet wide and two inches deep where the various outbreak flows had joined to

enter Barnes Drain. The vegetation was iron stained in the flow from the leachate outbreaks and a sheen (believed to be bacterial rather than petroleum in nature) was also observed. Woodchuck holes against the north and south school building walls were found to include cinder and glass fragments and bottles in their spoil piles. The school yard south of the school was flooded to a depth of approximately eight inches over an area of approximately 1/4 acre.

It appeared that grading of the land surface due south of the school building produced the berm between it and Hines Drive. The fence was constructed on fill material rather than enclosing it at this location and a woodchuck hole under the fence was found to have glass, pop bottle tops, and cinders in the spoil pile. Automobile tires were seen in this area as well. In the tree line south of the Barnes Drain culvert that runs through the property, one empty rusty drum was observed. To the immediate north, along the southeast face of the fill adjoining Ann Arbor Trail, automobile brake shoes were found. In the woods along the west side of the fill, it appeared that residents of the subdivision had disposed of yard waste, Christmas trees, rusted lawn furniture and tires.

Hand held field personal protection monitoring equipment (HNu, radiation detector, oxygen/explosivity meters) did not detect any evidence of contaminants present at levels elevated above background concentrations.

3.3 Sampling Procedures

Site investigations were conducted in three stages during the ESI. These stages occurred in early spring, late spring and mid-summer. During the week of March 30, 1993, site surveying to set the Electromagnetometer (EM) lines was conducted. On March 31, 1993, soil samples were collected at

the site and surface water (including a leachate sample) and sediment samples were collected downgradient of the site. Soil samples were collected from on-site and from five selected yards in the subdivision west of the site and one yard east of the site. Samples were collected by the investigation team to determine the nature and levels of contaminants present at and around the site and to supplement data previously collected.

During the weeks of May 3 and 10, the EM survey was conducted. The Geoprobe monitoring wells were also installed and sampled on May 5. Finally, during the week of August 16, the site soil borings were conducted. Photographs of the samples and their locations, along with general site photographs, are provided in Appendix C.

As directed by the U.S. EPA, all soil, surface water, and sediment organic sample analyses were conducted by Southwest Research Institute in San Antonio, Texas while the soil, surface water, and sediment inorganic sample analyses were conducted by Skinner & Sherman Labs, Inc. in Waltham, Massachusetts. All monitoring well organic sample analyses were conducted by Environmental Control Technology Corp. in Ann Arbor, Michigan. The monitoring well inorganic sample analyses were conducted by Skinner & Sherman Labs, Inc. in Waltham, Massachusetts.

Soil Sampling Procedures. Surficial soil samples were collected from the Cooper School property, a private residence east of the school, five residences in a subdivision west of the school, and in the vicinity of the sledding hill south of Hines Drive. Two general area background locations, one located in an undisturbed portion of the cemetery west of Whittier School and one located in the County park approximately 150 yards north of Hines Drive near Merriman Road, were also sampled. Soil samples

were collected to determine the nature and extent of contaminants present at levels of concern in surface soils of the residences and school property. The soil sampling locations are presented in Figure 3-1.

The soil samples were collected from depths of zero to eight inches using hand trowels. Upon collection, the sample was transferred to a disposable aluminum pan. After all visible debris (stones, roots, etc.) was removed, the sample was thoroughly mixed and transferred to the appropriate sample containers using the trowel. The volatile portions of each sample were collected first. The two background soil samples were collected before the remaining samples to reduce the opportunity for cross contamination between locations.

Surface Water Sampling Procedures. Surface water samples were collected to determine whether significant organic or inorganic contaminants have entered Barnes Drain and migrated into the Middle Rouge River as a result of the leachate outbreak, infiltration of the drain, or through general runoff. Ten surface water samples (including one duplicate) were collected during the ESI. These samples were collected from the leachate outbreak, the drain on the Cooper School property, the drain in the wetland along the Middle Rouge Parkway, the Middle Rouge River, and a dredged pond east of the school building on private property. Sampling locations are presented in Figure 3-2.

All surface water samples were collected by completely immersing the sample bottles and rinsing with ambient water before collecting the sample. Conductivity, pH and temperature readings were recorded at each sampling location. The metals portion of the samples were field filtered, all inorganic and volatile organic samples were preserved and all samples were packaged and shipped to the analytical laboratories according to U.S. EPA requirements.

FIGURE 3-1
SOIL SAMPLING LOCATIONS

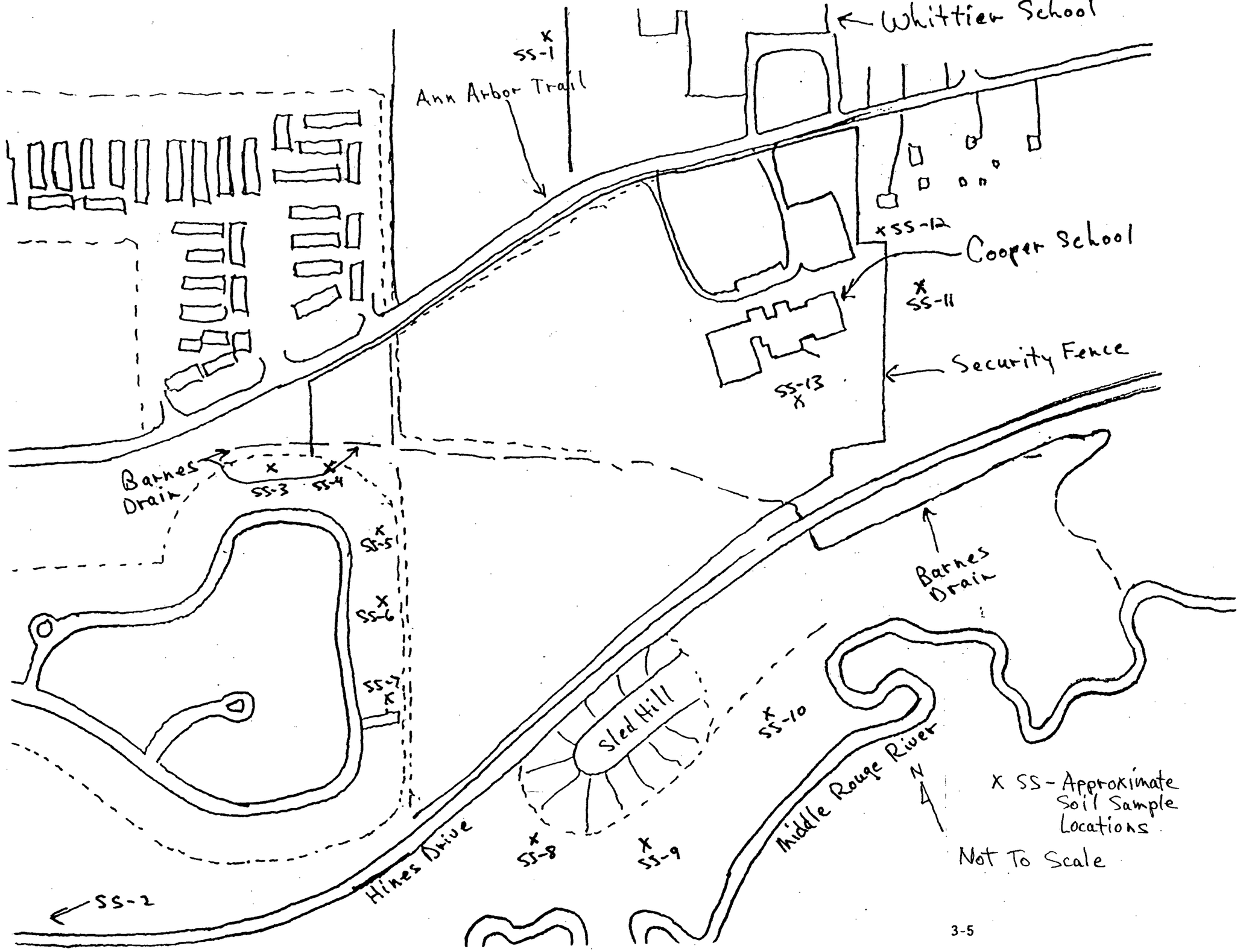
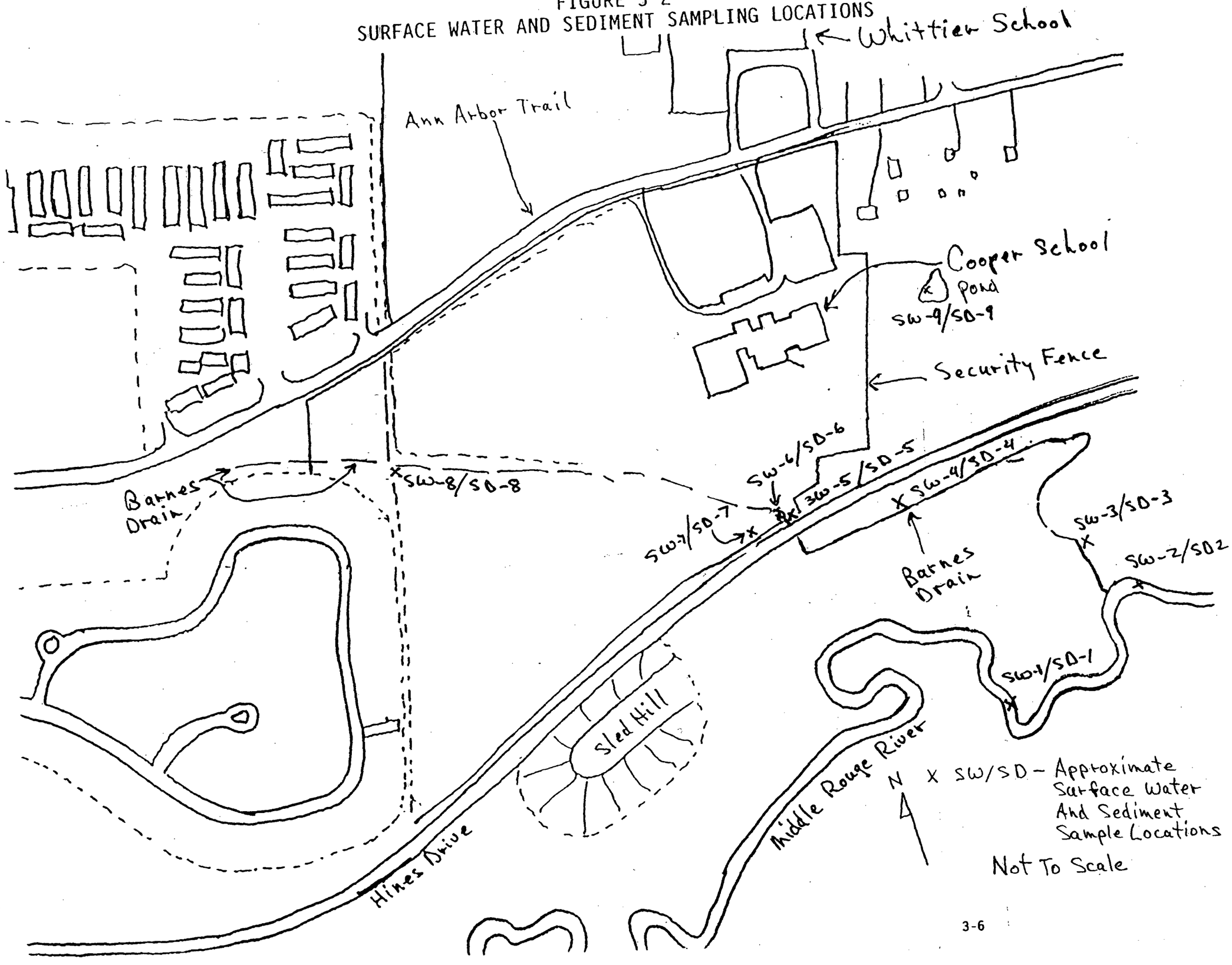


FIGURE 3-2
SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

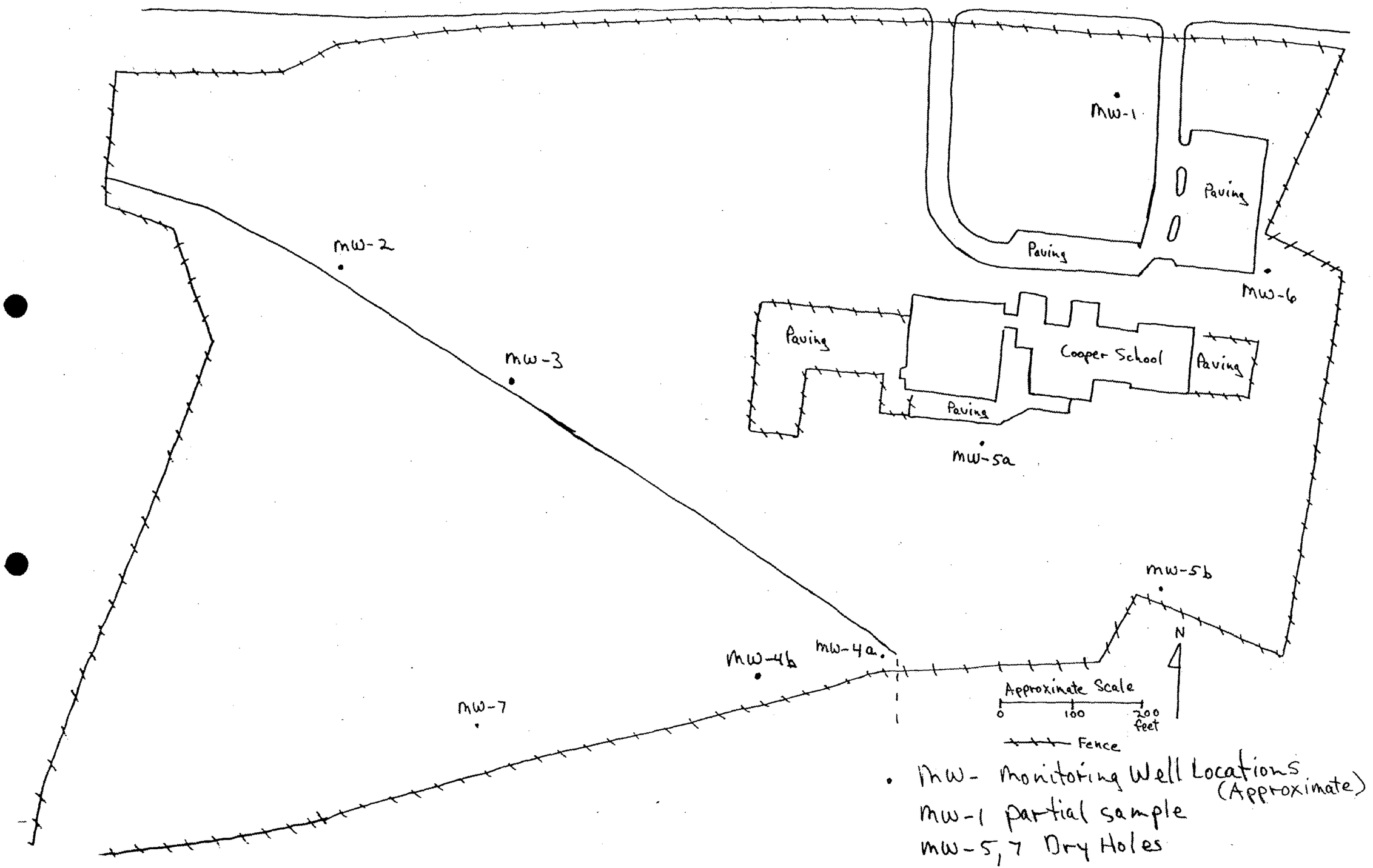


Sediment Sampling Procedures. Sediment samples were also collected to determine whether significant organic or inorganic contaminants have entered Barnes Drain and migrated into the Middle Rouge River as a result of the leachate outbreak, infiltration of the drain, or through general runoff. Nine sediment samples were collected in association with the surface water samples during the ESI. Sampling locations are presented in Figure 3-2. Where the sediment sampling locations coincided with surface water samples, they were collected after the surface water samples had been collected.

The sediment samples were collected using a hand-held sediment corer in the shallow water locations and a ponar dredge in the deeper water locations. Each sediment sample was placed in a disposable aluminum pan where all visible debris was removed and the sample was thoroughly mixed. The sample was then placed in the sample jars using a trowel with the volatile portion of the samples being collected first. Dedicated trowels and aluminum pans were used to eliminate the chance of sample cross contamination from this equipment. The sediment corer/ponar was decontaminated prior to the collection of the next sample with a tri-sodium phosphate tap water solution, followed by tap water and deionized water rinses. All samples were packaged and shipped to the analytical laboratories according to U.S. EPA requirements.

Monitoring Well Installation and Sampling Procedures. Monitoring wells were installed and sampled to determine whether organic or inorganic compounds had entered the water table aquifer beneath the fill material. These samples were also collected to determine whether compounds could migrate to Barnes Drain or the leachate seep. Five monitoring wells were installed and sampled by a truck mounted Geoprobe drilling rig. The ESI Geoprobe monitoring well locations are presented in Figure 3-3.

FIGURE 3-3
GEOPROBE MONITORING WELL SAMPLING LOCATIONS



The Geoprobe drilling rig consists of a hydraulic drive unit mounted on a large van with a portable GC/MS capable of analyzing for volatile organic compounds in head space of sample vials. The rig drives 1 and 1/2 inch galvanized well pipe with an 18 inch stainless steel wrapped wire screen at the end to the desired depth for ground water sample collection. The temporary well is sampled using a peristaltic pump and dedicated tubing for each well. Because the well is installed directly into an unexposed water layer, the well does not require purging before sampling unless the well has been allowed to remain in place for an extended period of time.

Prior to sampling, conductivity, pH and temperature readings were recorded at each sampling location. All sample bottles were rinsed with ambient water before collecting the sample. The volatile portion of the samples were collected first with the pump set at a low flow rate to reduce bubble formation and sparging. The metals samples were field filtered, all inorganic and volatile organic samples were properly preserved and all samples were packaged and shipped to the analytical laboratories according to U.S. EPA requirements.

Electromagnetic Survey Procedures. Electromagnetic surveys provide a means of measuring the electrical conductivity of subsurface soils, rock, and groundwater as well as detecting conductive buried metals. Conductivity is defined as the ability of a medium to transmit an electric current. A medium that can pass an electric current easier than another has a higher conductivity (clays and metals have a higher conductivity than most sands).

An electromagnetic survey was conducted at the site to provide an assessment of the location of buried refuse and the potential for large conductivity anomalies which could indicate the presence of buried metal

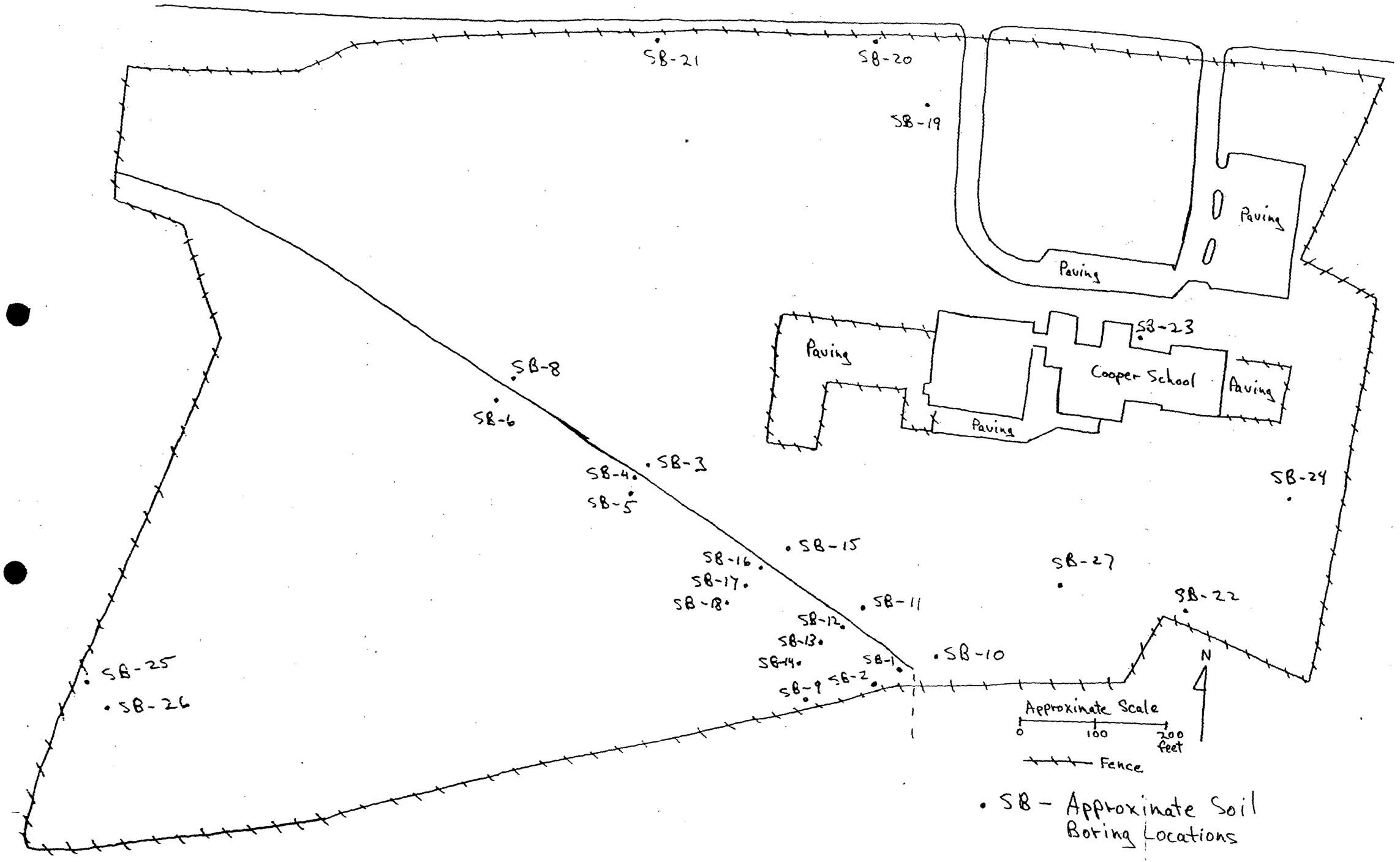
or drums. The survey was conducted by traversing the ground surface in a grid pattern. This was accomplished by surveying in and staking grid lines on an east-west basis and then running traverse lines in a north to south orientation with survey stations every 10 feet. The survey was conducted in the area south and west of the Cooper School building. A similar survey was completed on the southern portion of the Whittier School property. An informal survey without surveyed traverse lines was also conducted west of the fence on the west side of the site. This survey was conducted to delineate the western extent of the Cooper School landfill property.

Soil Borings Procedures. Soil borings were conducted at the site to evaluate the nature of the fill material and to locate the surface elevation of the clay around the site and in the channel of Barnes Drain. The elevation of the clay surface was determined to characterize leachate flow and collection in the landfill. No soil samples were collected from the borings for laboratory analysis. Borings were conducted using the truck mounted Geoprobe rig which drove sleeved spoons to the required depth. In general, spoons were run at two foot intervals until the clay surface had been located. The boring location and relative surface elevation was surveyed for each boring. Boring location are presented in Figure 3-4.

3.4 Analytical Results

This section includes organic and inorganic compound analytical results of soil, surface water, sediment, and monitoring well samples collected during the ESI field work. The EM survey and soil boring results are also presented.

FIGURE 3-4
SOIL BORING LOCATIONS



Soil sample descriptions are presented in Table 3-1 while the key sample analytical results are presented in Table 3-2. Surface water sample descriptions are presented in Table 3-3 while the key sample analytical results are presented in Table 3-4. The sediment sample descriptions are presented in Table 3-5 while the key sample analytical results are presented in Table 3-6. The Geoprobe monitoring well sample descriptions are presented in Table 3-7 while the key sample analytical results are presented in Table 3-8. The sample results are presented on a location by location basis for those compounds which were detected at concentrations greater than three times the background concentration or at concentrations greater than the Sample Quantitation Limit (SQL) if the compound was not detected in the background sample. The EM survey results are presented in Figure 3-5 while the extent of waste as estimated from the EM survey is presented in Figure 3-6.

The laboratory analytical data for the soil, surface water, sediment, and monitoring well samples, the Contract Laboratory Program (CLP) quantification/detection limits, and the data validation report are provided in Appendix D. The EM survey report and the soil boring logs conducted during the ESI are presented in Appendix E and Appendix F respectively.

TABLE 3-1

COOPER SCHOOL ESI SOIL SAMPLE DESCRIPTIONS

SAMPLE#	LOCATION	APPEARANCE	DEPTH	DESIGNATION
SS1	SE corner of cemetery @ 20 ft. E of tombstone and 10 ft. N of tree.	Dark organic fine grained mixed with clay.	0-6 in.	Background, shallow grab sample
SS2	Park area N of Hines River Drive. @ 6 ft. W of tree and 100 ft S of houses.(Hines Drive Park)	Dark brown to black soil with roots, and other organic matter.	0-6 in.	Background, shallow grab sample
SS3	29168 Brody St. lawn. @ 4 ft. S of fence and 10 ft. N of garage.	Dark brown to black soil, some roots, and traces of clay.	0-8 in.	Shallow grab sample
SS4	29132 Brody St. lawn. @ 4 ft. W of garage and 8 ft. S of the fence.	Dark brown to black soil, fine grained, with some root matter.	0-6 in.	Shallow grab sample
SS5	29098 Brody St. lawn. @ 4 ft. S of fence's NW corner.	Dark brown to black soil, fine grained, some roots, and some clay.	0-6 in.	Shallow grab sample
SS6	29074 Brody St. lawn. @ 3 ft. SW of the fence and 15 ft. N of the garage.	Dark brown to Black soil, fine grained, with some clay, and a trace of sand.	0-8 in.	Shallow grab sample
SS7	29004 Brody St. lawn. @ 12 ft. S of the fence and 6 ft. N of the garage.	Dark brown to black soil, fine grained, with some roots and clay.	0-8 in.	Shallow grab sample

TABLE 3-1 (Cont.)

COOPER SCHOOL ESI SOIL SAMPLE DESCRIPTIONS

SAMPLE#	LOCATION	APPEARANCE	DEPTH	DESIGNATION
SS8	@ 100 ft. SW of the sled hill and 10 ft. N of the forest and fence line.	Mix of brown to tan mud, with clay.	0-8 in.	Shallow grab sample
SS9	@ 30 ft. S of the sled hill and 5 ft. N of the fence.	Dark brown to black soil, fine grained, intermixed with clay.	0-8 in.	Shallow grab sample
SS10	@ 50 ft. SE of the sled hill and 5 ft. W of the brush trees.	Black mucky soil with some organic matter.	0-10 in.	Shallow grab sample
SS11	To the E of Cooper School just beyond the the fence.	Dark fine to medium grained sand, some organic matter.	0-8 in.	Shallow grab sample
SS12	28335 Ann Arbor Trail Rd. lawn. @ 200 ft. SW of the barn and 15 ft. E of S Ann Arbor Trail.	Brown to dark brown soil, fine grained intermixed with clay and roots.	0-8 in.	Shallow grab sample
SS13	@ 120 ft. N of Cooper School and 3 ft. W of a drain cover.	Dark brown soil intermixed with some clay.	0-6 in.	Shallow grab sample

TABLE 3-2

COOPER SCHOOL ESI KEY SOIL SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRDL
SS1	Shallow background sample			
SS2	Shallow background sample			
SS3	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	4,4-DDE	320J	26	42
	Alpha-chlordane	1,000C	9.6J	22
	Gamma-chlordane	490JC	5.8	22
	Heptachlor	43	0.2J	22
	Heptachlor epoxide	310JC	2.2	22
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Mercury	0.32	0.06UJ	0.05
SS4	Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)
	Hexachlorobenzene	440	430U	430
	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	4,4-DDE	620C	10	43
	Alpha-chlordane	1,900C	9.6J	22
	Endrin	48J	0.31J	43
	Gamma-chlordane	1,100JC	5.8	22
	Heptachlor	91	0.2J	22
	Heptachlor epoxide	320J	2.2	22
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Lead	96.2	15.1	1
SS5	Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)
	Phenol	570	430U	440
	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	Alpha-chlordane	520JC	9.6J	23
	Gamma-chlordane	320	5.8	23
	Heptachlor epoxide	120J	2.2	23
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Cadmium	0.41J	0.33U	0.34
SS6	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	4,4-DDD	9.7J	2.1J	3.9

TABLE 3-2 (CONT.)

COOPER SCHOOL ESI KEY SOIL SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRQL
SS7	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	Alpha-chlordane	650JC	9.6J	21
	Gamma-chlordane	450C	5.8	21
	Heptachlor	88	0.2J	21
	Heptachlor epoxide	120J	2.2	21
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Sodium	120J	92.6U	8.8
SS8	Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)
	Phenol	770	430U	400
	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	4,4-DDD	26J	2.1J	4.0
	4,4-DDE	78	10	4.0
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Sodium	179J	92.6U	9.2
SS9	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	4,4-DDD	110J	2.1J	44
	4,4-DDE	1,200C	10	44
	4,4-DDT	570C	4.0J	44
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Silver	1.4J	1.1U	1.2
	Sodium	118J	92.6U	10.2
SS10	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	4,4-DDD	22J	2.1J	5.1
	4,4-DDE	790C	10	5.1
	4,4-DDT	310	4.0J	5.1
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Sodium	205J	92.6U	11.4
SS11	Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)
	4,4-DDD	8.8J	2.1J	3.8
	4,4-DDE	79	10	3.8
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Cyanide	0.61	0.57U	0.57

TABLE 3-2 (CONT.)

COOPER SCHOOL ESI KEY SOIL SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRDL
SS12	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Sodium	105J	92.6U	9.0
SS13	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Sodium	118J	92.6U	9.2

TABLE 3-3

COOPER SCHOOL ESI SURFACE WATER SAMPLE DESCRIPTIONS

SAMPLE#	LOCATION	APPEARANCE	DEPTH	DESIGNATION
SW1	Middle Rouge River 300 ft. W of Barnes Drain.	Cloudy	Surface	Background, grab sample
SW2	SW of a retaining wall in the Middle Rouge River. Downstream of Barnes Drain.	Cloudy	Surface	Grab sample
SW3	Barnes Drain S of Hines Dr. 200 ft. upstream of Middle Rouge River.	Slightly cloudy	Surface	Grab sample
SW3D	Same as SW3	Same as SW3	Surface	Duplicate grab sample
SW4	Barnes Drain S of Hines Dr. at the nutrient seep. @ 200 ft. downstream of Hines Dr.	Slightly cloudy	Surface	Grab sample
SW5	Barnes Drain N of Hines Dr. down stream of leachate seep.	Cloudy with leachate stains	Surface	Grab sample
SW6	W of SW5 at the head of the leachate flow.	Clear	Surface	Grab sample
SW7	W of SW6 in the leachate flow	Clear	Surface	Grab sample
SW8	Ponded water near the W edge of Cooper School property.	Clear	Surface	Grab sample
SW9	Ponded water E of Cooper School and the security fence.	Clear with tannish hue.	Surface	Grab sample

TABLE 3-4

COOPER SCHOOL ESI KEY SURFACE WATER SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRDL
SW1	Background sample			
SW2	No key sample contaminants detected			
SW3	Semi-volatiles	(ug/l)	(ug/l)	(ug/l)
	Fluoranthene	10	10U	10
	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Cyanide	13.2	10.0U	10.0
	Manganese	578	72.7	15
	Potassium	11,000	3,610J	5000
	Sodium	267,000	63,900	5000
SW4	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Cyanide	11.6	10.0U	10.0
	Manganese	446	72.7	15
	Potassium	11,500	3,610J	5000
	Sodium	231,000	63,900	5000
	Zinc	41.6	13.7U	4.7
SW5	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Cyanide	10.0	10.0U	10.0
	Magnesium	55,900	16,600	5000
	Manganese	399	72.7	15
	Nickel	5.2J	3.0U	3.0
	Potassium	16,800	3,610J	5000
	Sodium	195,000	63,900	5000
	Zinc	65.1	13.7U	4.7
SW6	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Calcium	265,000	75,900	5000
	Magnesium	79,100	16,600	5000
	Manganese	336	72.7	15
	Nickel	14.0J	3.0U	3.0
	Potassium	27,500	3,610J	5000
	Zinc	125	13.7U	4.7
SW7	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Calcium	269,000	75,900	5000
	Iron	338	105U	6.5
	Magnesium	85,000	16,600	5000
	Manganese	482	72.7	15
	Nickel	14.5J	3.0U	3.0
	Potassium	28,900	3,610J	5000
	Zinc	89.1	13.7U	4.7

TABLE 3-4 (CONT.)

COOPER SCHOOL ESI KEY SURFACE WATER SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRDL
SW7D	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Calcium	267,000	75,900	5000
	Iron	303	105U	6.5
	Magnesium	83,500	16,600	5000
	Manganese	435	72.7	15
	Nickel	14.5J	3.0U	3.0
	Potassium	28,600	3,610J	5000
	Zinc	107	13.7U	4.7
SW8	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Cyanide	12.9	10.0U	10.0
	Magnesium	81,200	16,600	5000
	Potassium	28,400	3,610J	5000
SW9	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Iron	532	105U	6.5
	Lead	4.5J	1.2J	5

TABLE 3-5

COOPER SCHOOL ESI SEDIMENT SAMPLE DESCRIPTIONS

SAMPLE#	LOCATION	APPEARANCE	DEPTH	DESIGNATION
SD1	Middle Rough River 300 ft. W of Barnes Drains.	Brown silty fine sand with traces of organic matter.	0-4 in.	Background, grab sample
SD2	SW of a retaining wall in the Middle Rouge River. Downstream of Barnes Drain.	Gray to brown, fine to medium sand.	0-3 in.	Grab sample
SD3	Barnes Drain S of Hines Dr. 200 ft. upstream of Middle Rouge River.	Black silty fine to medium sand with some clay and organic matter.	0-10 in.	Grab sample
SD4	Barnes Drain S of Hines Dr. at the nutrient seep. @ 200 ft. downstream of Hines Dr.	Dark brown fine to coarse sand, some silt. Black fine to medium sand, some silt and clay.	0-4 in. 4-8 in.	Grab sample
SD5	Barnes Drain N of Hines Dr. down stream of leachate seep.	Gray to brown to iron stained silty fine to medium sand with some organic matter.	0-6 in.	Grab sample
SD6	W of SW5 at the head of leachate flow.	Brown to gray silty sand with clay, lots of roots and leaves. Red iron stains on the surface of leaves.	0-6 in.	Grab sample
SD7	W of SW6 in the leachate flow.	Brown silty fine sand with some clay.	0-6 in.	Grab sample
SD8	Ponded water near the W edge of Cooper School property.	Brown silty fine to medium sand with traces of clay and organic matter.	0-6 in.	Grab sample

TABLE 3-5 (Cont.)

COOPER SCHOOL ESI SEDIMENT SAMPLE DESCRIPTIONS

SAMPLE#	LOCATION	APPEARANCE	DEPTH	DESIGNATION
SD9	Ponded water E of Cooper School and the security fence.	Dark brown soil and muck, with some organic matter.	0-1 in.	Grab sample

TABLE 3-6

COOPER SCHOOL ESI KEY SEDIMENT SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRDL
SD1	Background sample			
SD2	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Cyanide	0.96	0.61U	0.66
SD3	Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)
	Benzo(a)anthracene	1,500	170J	770
	Benzo(a)pyrene	1,200	280J	770
	Benzo(b)fluoranthene	2,600	670	770
	Bis(2-ethylhexyl)phthalate	3,600	140J	770
	Butylbenzylphthalate	1,100	67J	770
	Chrysene	1,900	320J	770
	Fluoranthene	2,900	390J	770
	Phenanthrene	1,800	230J	770
	Pyrene	3,900	370J	770
	Pesticides/PCBs	(ug/l)	(ug/l)	(ug/l)
	4,4-DDE	27J	8.7J	7.7
	Alpha-chlordane	39J	2.8UJ	4.0
	Endrin aldehyde	48J	13J	7.7
	Gamma-chlordane	35J	2.7UJ	4.0
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Arsenic	10.1J	3.0J	2
	Cadmium	1.3J	0.33U	0.64
	Chromium	32.1	10.3	2
	Copper	63.2	12.9	5
	Cyanide	1.4	0.61U	1.2
	Lead	209	23.6	1
	Mercury	0.36	0.12J	0.04
	Zinc	412J	74J	4
SD4	Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)
	Bis(2-ethylhexyl)phthalate	630	140J	400
	Phenanthrene	840	230J	400
	Pyrene	1,300	370J	400
	Pesticides/PCBs	(ug/l)	(ug/l)	(ug/l)
	Alpha-chlordane	5.8J	2.8UJ	2.1
	Gamma-chlordane	6.1J	2.7UJ	2.1
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Beryllium	0.55J	0.22U	0.21
	Iron	33,800	7,110	20

TABLE 3-6 (CONT.)

COOPER SCHOOL ESI KEY SEDIMENT SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRDL
SD5	Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)
	Anthracene	450	440U	450
	Benzo(a)anthracene	1,000	170J	450
	Benzo(a)pyrene	940	280J	450
	Chrysene	1,000	320J	450
	Fluoranthene	1,900	390J	450
	Phenanthrene	1,900	230J	450
	Pyrene	1,800	370J	450
	Pesticides/PCBs	(ug/l)	(ug/l)	(ug/l)
	Alpha-chlordane	6.4J	2.8UJ	2.3
	Aroclor-1254	74J	43UJ	45
	Gamma-chlordane	5.9J	2.7UJ	2.3
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Beryllium	0.76J	0.22U	0.24
	Cyanide	0.96	0.61U	0.72
	Lead	81.0	23.6	1
SD6	Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)
	Fluoranthene	1,600	390J	700
	Phenanthrene	1,200	230J	700
	Pyrene	1,300	370J	700
	Pesticides/PCBs	(ug/l)	(ug/l)	(ug/l)
	Alpha-chlordane	5.6J	2.8UJ	3.6
	Gamma-chlordane	5.9J	2.7UJ	3.6
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Arsenic	11.4J	3.0J	2
	Barium	263	30.2J	40
	Calcium	123,000J	22,400J	1000
	Copper	65.0	12.9	5
	Cyanide	1.3	0.61U	1.1
	Iron	68,600	7,110	20
	Lead	161	23.6	1
	Manganese	1,850	280	3
	Nickel	30.1	7.5J	8
	Zinc	598J	74J	4
SD7	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Barium	99.1	30.2J	40
	Calcium	70,900J	22,400J	1000
	Iron	29,100	7,110	20

TABLE 3-6 (CONT.)

COOPER SCHOOL ESI KEY SEDIMENT SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRDL
SD8	Pesticides/PCBs	(ug/l)	(ug/l)	(ug/l)
	4,4-DDE	36	8.7J	4.9
	Alpha-chlordane	2.7J	2.8UJ	2.5
	Inorganics	(mg/kg)	(mg/kg)	(mg/kg)
	Beryllium	0.27J	0.22U	0.24
	Lead	85.3	23.6	1
SD9	No key sample contaminants detected			

TABLE 3-7

COOPER SCHOOL ESI TEMPORARY GEOPROBE WELL SAMPLE DESCRIPTIONS

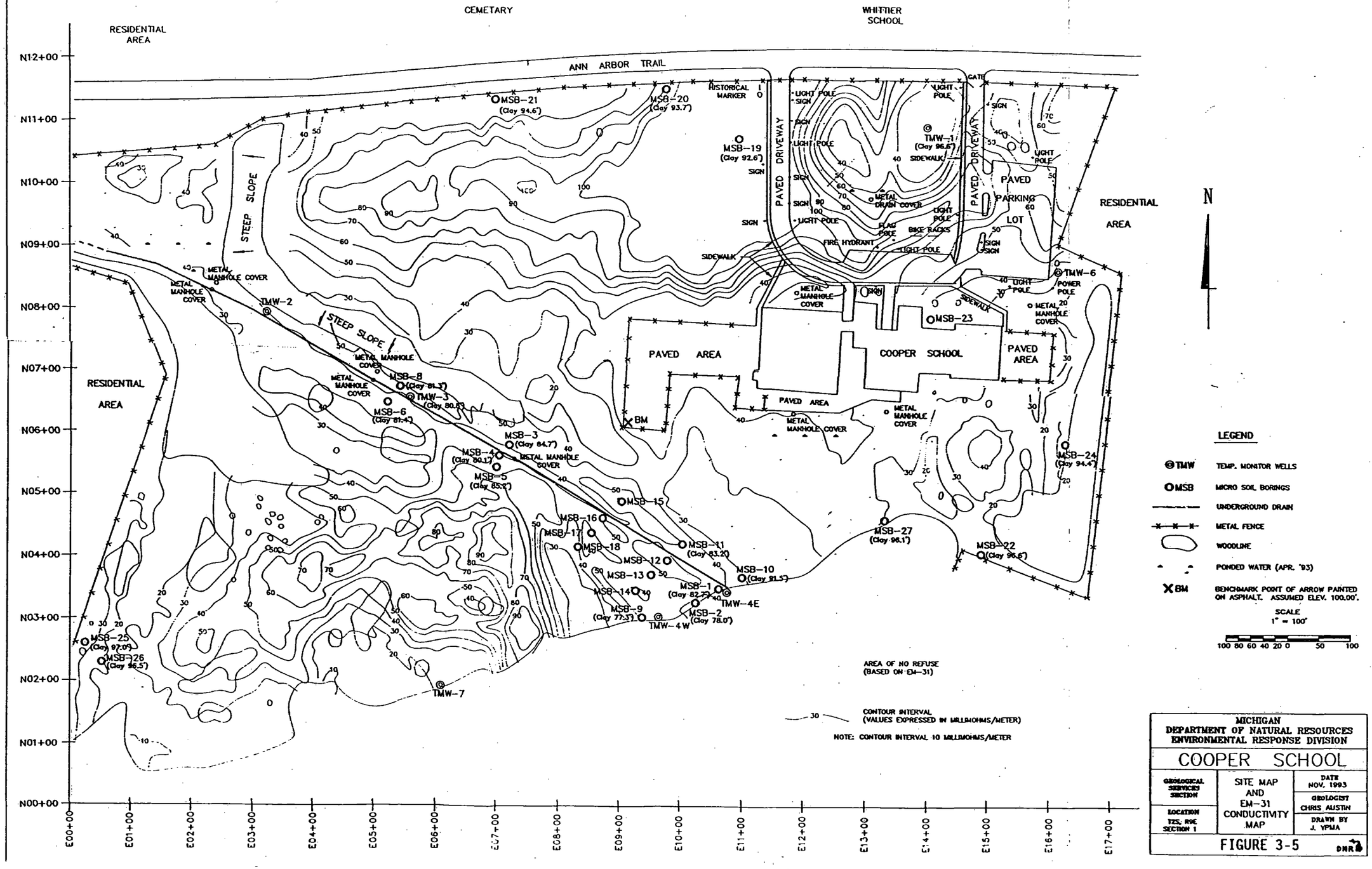
SAMPLE#	LOCATION	APPEARANCE	DEPTH	DESIGNATION
MW1	NE corner of the lawn N of Cooper School.	Clear	7 ft.	Background, grab sample
MW2	W of Cooper School next to Barnes Drain. @ 150 ft. NE of the residential fence NE corner.	Clear	12 ft.	Grab sample
MW3	@ 200 ft. SE of MW2 next to Barnes Drain.	Clear	10.5 ft.	Grab sample
MW4	@ 250 ft. SSE of bench mark located in the SW corner of paved area.	Clear	16.5 ft.	Grab sample
MW4D	Duplicate of MW4	Same as MW4	16.5 ft.	Grab sample
MW6	@ the SE corner of the NE paved parking lot.	Clear	7 ft.	Grab sample

TABLE 3-8

COOPER SCHOOL ESI KEY GEOPROBE MONITORING WELL SAMPLE ANALYTICAL RESULTS

SAMPLE#	COMPOUND	CONCENTRATION	BACKGROUND CONC.	SQL/CRQL
MW1	Background Sample			
MW2	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Arsenic	11.4	2.7J	10
	Barium	382	27.9J	200
	Iron	8,880	36.2U	8.4
	Lead	5.5	3.0U	0.6
	Magnesium	91,400	25,400	5000
	Manganese	3,610	757	15
	Nickel	5.9J	4.2U	4.2
	Potassium	55,100	6,770	5000
	Sodium	187,000	13,600	5000
	Zinc	38.4	17.1U	4.8
MW3	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Barium	351	27.9J	200
	Chromium	3.9J	3.3U	3.3
	Iron	60.8J	36.2U	8.4
	Magnesium	90,800	25,400	5000
	Potassium	66,200	6,770	5000
	Sodium	246,000	13,600	5000
MW4	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Barium	357	27.9J	200
	Iron	10,500	36.2U	8.4
	Magnesium	95,000	25,400	5000
	Nickel	23.5J	4.2U	4.2
	Potassium	46,900	6,770	5000
	Sodium	75,400	13,600	5000
	Zinc	216	17.1U	4.8
MW4D	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Barium	242	27.9J	200
	Iron	20,100	36.2U	8.4
	Magnesium	105,000	25,400	5000
	Manganese	2,760	757	15
	Nickel	9.3J	4.2U	4.2
	Potassium	53,700	6,770	5000
	Sodium	82,100	13,600	5000
	Zinc	1,590	17.1U	4.8
MW6	Inorganics	(ug/l)	(ug/l)	(ug/l)
	Barium	657	27.9J	200
	Iron	22,200	36.2U	8.4
	Sodium	231,000	13,600	5000
	Zinc	192	17.1U	4.8

FIGURE 3-5
ELECTROMAGNETOMETER SURVAY MAP



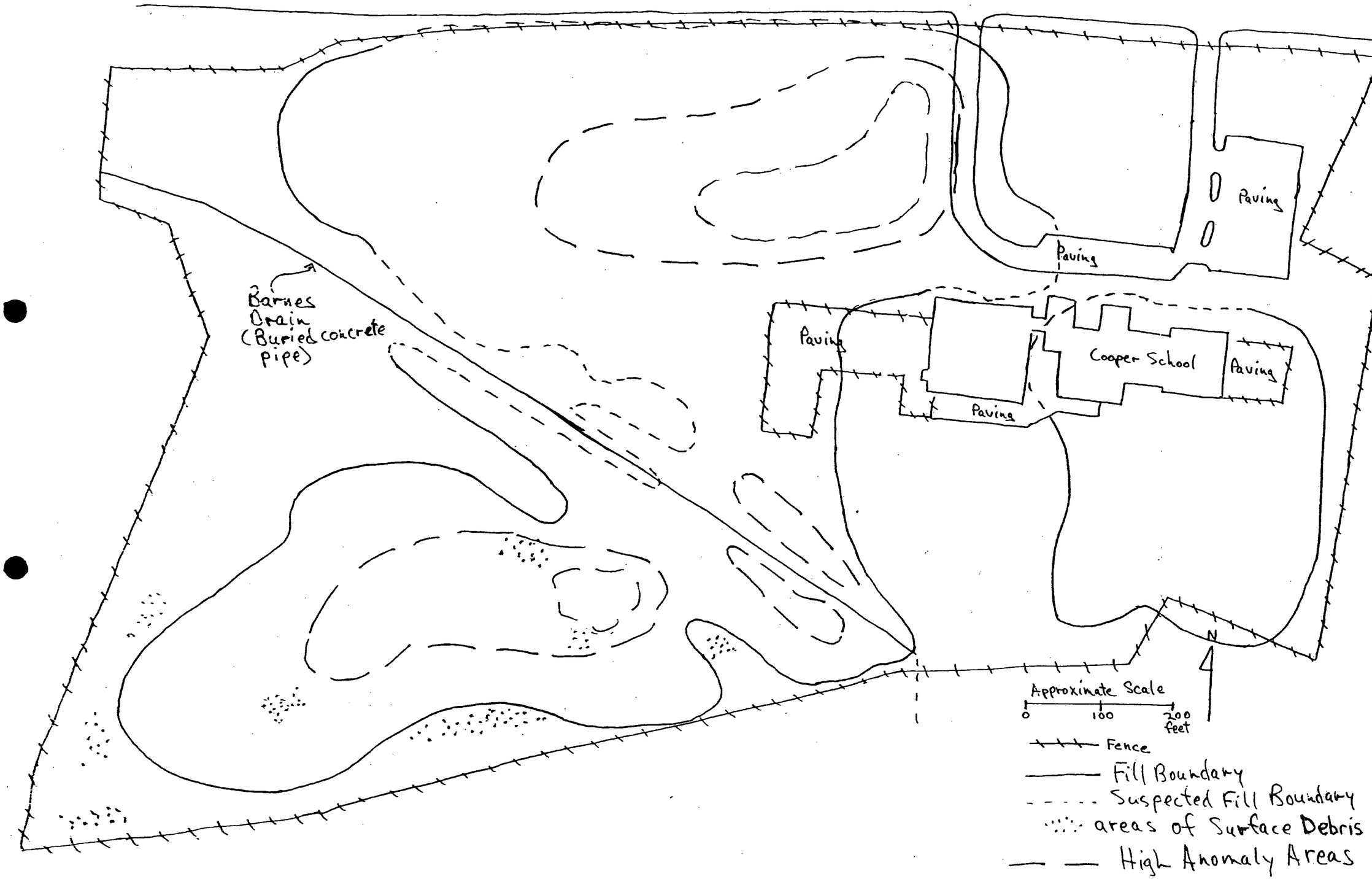
MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL RESPONSE DIVISION

COOPER SCHOOL

GEOLOGICAL SERVICES SECTION	SITE MAP AND EM-31 CONDUCTIVITY MAP	DATE NOV. 1993
		GEOLOGIST CHRIS AUSTIN
LOCATION T2S, R9E SECTION 1		DRAWN BY J. YPMA

FIGURE 3-5 DNR

FIGURE 3-6
EXTENT OF WASTE MAP



4. DISCUSSION OF MIGRATION PATHWAYS

4.1 Introduction

This section discusses data and information that apply to possible migration pathways and to determine whether significant organic or inorganic contaminants have entered Barnes Drain and migrated into the Middle Rouge River as a result of the leachate outbreak, infiltration of the drain, or through general runoff. The four migration pathways of concern discussed are ground water, surface water, soil exposure and air.

4.2 Ground Water

The monitoring well samples collected at the Cooper School site have revealed the presence of some inorganic contaminants elevated in concentration relative to the background sample. These data are summarized in Tables 4-1. Table 4-1 also compares these concentration to Part 201 drinking water and ground water/surface water interface (GSI) cleanup criteria values. Two compounds, iron and manganese were detected at levels above their respective aesthetic drinking water value while lead slightly exceeded the health based drinking water standard. Three compounds were detected at levels which slightly exceeded the GSI values. These compounds include: arsenic, barium, and zinc.

Area well logs indicate that the geology consists of a thin two to four feet thick upper topsoil layer enhanced by fill soils underlain by a thick brown or gray clay deposit. The clay layer appears to be continuous throughout the area. This characteristic is confirmed by soil borings conducted at the site. This geology creates two aquifers, one low yield,

TABLE 4-1

COOPER SCHOOL ESI KEY GEOPROBE MONITORING WELL SAMPLE SUMMARY

CONTAMINANT	KEY SAMPLE CONCENTRATIONS LOWEST	HIGHEST	BACKGROUND CONC.	MICHIGAN ACT 451 PART 201 DRINKING WATER/GSI CLEANUP CRITERIA*	# OF KEY SAMPLES
Inorganics	(ug/l)	(ug/l)	(ug/l)	(ug/l)	
Arsenic		11.4	2.7J	50/11	1
Barium	242	657	27.9J	2,000/630	4
Chromium		3.9J	3.3U	100/77	1
Iron	60.8J	22,200	36.2U	(300)/NA	4
Lead		5.5	3.0U	4/6.6	1
Magnesium	90,800	105,000	25,400	4.2E+5/NA	3
Manganese	2,760	3,610	757	(50)/NA	2
Nickel	5.9J	23.5J	4.2U	100/57	2
Potassium	46,900	66,200	6,770	NA/NA	3
Sodium	75,400	246,000	13,600	1.6E+5/NA	4
Zinc	38.4	1,590	17.1U	2,400/81	3

A total of five (5) monitoring wells were sampled during the ESI including one (1) upgradient background well.

* - Cleanup criteria values in brackets () denote an aesthetic value. The aesthetic value is used either when a health risk value has not been determined or the aesthetic value is lower than the health risk value.

occasionally dry water table aquifer and a bedrock aquifer. There seems to be no connection between the water table and the bedrock aquifer. No homes within a four mile radius of the site draw drinking water from the bedrock aquifer. All homes are connected to the municipal water supply system whose source is surface water remote to the site.

Releases have occurred to the ground water, water table aquifer at the site as evidenced by the detection of contaminants in the ground water and leachate samples. However, the ground water pathway is not considered to be at risk for the following reasons. Only one compound of concern, lead, was detected at a level which slightly exceeded the MDNR Part 201 cleanup standards for drinking water. Production in the water table aquifer is low in quantity and not subject to tapping by private well for public use. Migration to deeper aquifers of concern does not appear possible due to local geology which consists of continuous thick clay layers which will protect any aquifer of concern. Migration of the water table aquifer appears to be channelized toward the former creek bed of Barnes Drain thus limiting the potential for migration in other directions offsite.

4.3 Surface Water

The land surface at the site is relatively flat although sloping into significant low lying areas such as the depressions north and south of the school and the bed of Barnes Drain. The slope to the south increases toward the Middle Rouge River. The point where Barnes Drain enters the Middle Rouge River is considered the Probable Point of Entry for release for HRS purposes.

The surface water and sediment samples collected during the ESI revealed the presence of several contaminants significantly elevated in

concentration relative to the background samples. These data are summarized in Table 4-2 and 4-3 respectively. These tables also compares the concentrations to Part 201 drinking water and GSI cleanup criteria values for the surface water and to direct contact cleanup criteria values for the sediment. As with the ground water pathway, lead was the only contaminant of concern detected in the surface water at concentrations that exceeded its health based drinking water value. Iron and manganese were also detected in the surface water at levels above their respective aesthetic drinking water value. Cyanide and zinc were the only compounds in the surface water detected at levels which exceeded their GSI values. The only compound in the sediment that exceeded the direct contact cleanup value was arsenic.

The presence of these contaminants in the leachate and surface water above background concentrations indicates that the contaminants are associated with ongoing releases from the fill material. However, while there appears to be a qualifying release to the surface water pathway, because few of these compounds exceed MDNR cleanup standards, the release does not appear to warrant remediation of the pathway. These concentrations do not justify immediate removal actions.

Barnés Drain is not used as a fishery but there are wetlands along its course to the Middle Rouge River. The Middle Rouge River, the receiving water body, serves as a restricted fishery within the 15 mile target distance limit (TDL) and approximately 6 miles of its shoreline is classified as hardwood wetland by the Department of Natural Resources in its wetlands inventory. These sensitive environments are shown on the 15 mile Surface Water TDL Map in Appendix B. Of these lands classified as wetlands, none is habitat for State designated threatened and endangered

TABLE 4-2

COOPER SCHOOL ESI KEY SURFACE WATER SAMPLE SUMMARY

CONTAMINANT	KEY SAMPLE CONCENTRATIONS LOWEST	HIGHEST	BACKGROUND CONC.	MICHIGAN ACT 451 PART 201 DRINKING WATER/GSI CLEANUP CRITERIA*	# OF KEY SAMPLES
Semi-volatiles	(ug/l)	(ug/l)	(ug/l)	(ug/l)	
Fluoranthene		10	10U	880/370	1
Inorganics	(ug/l)	(ug/l)	(ug/l)	(ug/l)	
Calcium	265,000	269,000	75,900	NA/NA	2
Cyanide	10.0	13.2	10.0U	200/5.2	4
Iron	303	532	105U	(300)/NA	2
Lead		4.5J	1.2J	4/6.6	1
Magnesium	55,900	85,000	16,600	4.2E+5/NA	4
Manganese	336	578	72.7	(50)/NA	5
Nickel	5.2J	14.5J	3.0U	100/57	3
Potassium	11,000	28,900	3,610J	NA/NA	6
Sodium	195,000	267,000	63,900	1.6E+5/NA	3
Zinc	41.6	125	13.7U	2,400/81	4

A total of ten (10) surface water samples were collected during the ESI including one (1) upgradient background sample and one (1) duplicate sample.

* - Cleanup criteria values in brackets () denote an aesthetic value. The aesthetic value is used either when a health risk value has not been determined or the aesthetic value is lower than the health risk value.

TABLE 4-3

COOPER SCHOOL ESI KEY SEDIMENT SAMPLE SUMMARY

CONTAMINANT	KEY SAMPLE CONCENTRATIONS LOWEST	HIGHEST	BACKGROUND CONC.	MICHIGAN ACT 451 PART 201 DIRECT CONTACT CLEANUP CRITERIA	# OF KEY SAMPLES
Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	
Anthracene		450	440U	4.2E+8	1
Benzo(a)anthracene	1,000	1,500	170J	14,000	2
Benzo(a)pyrene	940	1,200	280J	1,400	2
Benzo(b)fluoranthene		2,600	670	14,000	1
Bis(2-ethylhexyl)-phthalate	630	3,600	140J	7.0E+5	2
Butylbenzylphthalate		1,100	67J	6.8E+7	1
Chrysene	1,000	1,900	320J	1.4E+6	2
Fluoranthene	1,600	2,900	390J	5.1E+7	3
Phenanthrene	840	1,900	230J	1.5E+6	4
Pyrene	1,300	3,900	370J	3.2E+7	4
Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	
4,4-DDE	27J	36	8.7J	29,000	2
Alpha-chlordane	2.7J	39J	2.8UJ	7,600	5
Aroclor-1254		74J	43UJ	2,300	1
Endrin aldehyde		48J	13J	NA	1
Gamma-chlordane	5.9J	35J	2.7UJ	7,600	4
Inorganics	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Arsenic	10.0J	11.4J	3.0J	5.5	2
Barium	99.1	263	30.2J	30,000	2
Beryllium	0.27J	0.76J	0.22U	2.3	3
Cadmium		1.3J	0.33U	210	1
Calcium	70,900J	123,000J	22,400J	NA	2
Chromium		32.1	10.3	6.3E+5	1
Copper	63.2	65.0	12.9	16,000	2
Cyanide	0.96	1.4	0.61U	9,300	4
Iron	29,100	68,600	7,110	NA	3
Lead	81.0	209	23.6	400	4
Manganese		1,850	280	2,000	1
Mercury		0.36	0.12J	130	1
Nickel		30.1	7.5J	32,000	1
Zinc	412J	598J	74J	1.4E+5	2

A total of nine (9) sediment samples were collected during the ESI including one (1) upgradient background sample.

species. A review of the Michigan Natural Features Inventory revealed that no State or Federal threatened or endangered species are known to exist in the area.

There are approximately 1,203,000 people utilizing the municipal water supply system in the area which is supplied from surface water bodies. The water intakes are located in the Detroit River and Lake Huron outside of the 15 mile TDL and thus are not considered at risk from site contamination.

4.4 Soil Exposure

According to Federal, State, and local file information reviewed, there is no documentation of an adverse incident of direct contact with organic and inorganic compounds at the Cooper School site.

The electromagnetic survey indicated that most of the study area within the fenced Cooper School property contains refuse and scattered buried metal. Surveys conducted in the area south and southwest of Whittier School and in the area west of the Cooper School fence did not detect the presence of waste. The extent of the fill area within the Cooper School site fence is estimated from the electromagnetic survey and shown in Figure 3-6. Due to the dense brush along the south, southwest, and east boundaries of the property and the metal fence to the north, the exact extent of the waste could not be determined. Similarly, interference from the Barnes Drain pipe and dense vegetation south of the pipe made it difficult to determine whether waste was present or absent in that area. High areas of conductance were detected in the playing field west of the paved entrance driveway and the southwest portion of the property. These areas are shown by additional dashed contour lines on Figure 3-5 and

labeled contour lines on Figure 3-6. The pattern of the contour lines, regular gradation from one level of conductance to another, and relative land elevation of these areas indicate that the high conductance is probably due to thickness of the waste or landfill. While scattered metal debris may be present (nails and roofing material was discovered in SB-19), drums are not suspected to be present.

The soil borings detected a ravine, the probable location of Barnes Drain before it was enclosed in the pipe, running through the property from the northwest to central south boundaries. The location of the Barnes Drain pipe is shown on Figure 3-6 and the ravine appears to lie somewhat to the southwest of the pipe near the southern end of the fenced area. It is suspected that the leachate outbreak area coincides with the more probable location of the ravine than the end of the pipe where Barnes Drain emerges to the surface north of Hines Drive. The ravine could form a pathway for migrating groundwater. Additional soil borings are needed to more accurately determine the location and depth of the ravine. Due to the dry or low yield nature of monitoring wells 1, 5, and 7 it is suspected that on-site and offsite migration of groundwater is minimal with the ravine collecting water generated from the fill.

The soil samples collected during the ESI are summarized in Table 4-4. This table compares the concentrations of detected compounds to Part 201 direct contact cleanup criteria values. None of the compounds that were detected exceed the direct contact hazard value. Referral to the location specific sample results reported in Table 3-2 emphasizes that no compounds were detected at levels of concern in the yards of homes in the subdivision west of the site or the home east of the site. These results indicate that contaminants are present in soils associated with the site but not at levels requiring remediation. These concentrations do not justify immediate removal actions.

TABLE 4-4

COOPER SCHOOL ESI KEY SOIL SAMPLE SUMMARY

CONTAMINANT	KEY SAMPLE CONCENTRATIONS LOWEST	HIGHEST	BACKGROUND CONC.	MICHIGAN ACT 451 PART 201 DIRECT CONTACT CLEANUP CRITERIA	# OF KEY SAMPLES
Semi-volatiles	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	
Hexachlorobenzene		440	430U	1.5E+6	2
Phenol	570	770	430U	6.6E+7	2
Pesticides/PCBs	(ug/kg)	(ug/kg)	(ug/kg)	(ug/kg)	
4,4-DDD	8.8J	110J	2.1J	41,000	5
4,4-DDE	78	1,200C	26	29,000	6
4,4-DDT	310	570C	29	29,000	2
Alpha-chlordane	520JC	1,900C	9.6J	7,600	4
Endrin		48J	0.31J	72,000	1
Gamma-chlordane	320	1,100JC	5.8	7,600	4
Heptachlor	43	91	0.2J	2,200	3
Heptachlor epoxide	120J	320J	2.2	1,100	4
Inorganics	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	
Cadmium		0.41J	0.35U	210	1
Cyanide		0.61	0.63U	9,300	1
Lead		96.2	15.1	400	1
Mercury		0.32	0.07UJ	130	1
Silver		1.4J	1.1U	2,000	1
Sodium	105J	205J	92.6U	1E+6	6

A total of thirteen (13) soil samples were collected during the ESI including two (2) shallow background soil samples.

Pedestrian access to the Cooper property is restricted by the site perimeter fence but access to Barnes Drain after it leaves the property is unrestricted. However, only one sediment compound was detected at a level which exceeded the Part 201 cleanup standard for direct contact hazard. Therefore, while there is potential for area residents to come in contact with contamination in Barnes Drain, it appears that there is little potential for significant exposure to contaminants from the site. There are approximately 12,916 people living within a one mile radius of the site.

4.5 Air

Air monitoring with reconnaissance instruments (Hnu photoionizer, combustible gas/oxygen meter, etc.) was performed throughout the site during the site reconnaissance. A release of potential contaminants to the air was not documented during the ESI. During the reconnaissance inspection, site-entry instruments did not detect levels above background concentrations at the site. The HNu photo-ionization meter did not detect any volatile organic compounds above background concentrations at the soil locations. Following the U.S. EPA approved work plan, further air samples were not collected.

There does not appear to be the potential for volatile or particulate migration of contaminants from the site. Volatile contaminants were not detected at significant levels at the site, surficial soil samples detected no compounds at levels of concern on the Cooper School property or in nearby private yards, the site area is well vegetated, and particulate materials in Barnes Drain are wetted and expected to remain in sediment materials. There are approximately 215,630 people living within

a four mile radius of the site. Other targets within the four mile radius, such as wetlands and critical habitat are not expected to be at risk due to the lack of an anticipated migration pathway.

5. BIBLIOGRAPHY

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MDNR-SAU, 1988, MDNR CERCLA Site Inspection Procedures Manual.

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U.S. Bureaú of the Census, 1991, 1990 census of population for Michigan, Washington, D.C.

Appendix A

Site 4-Mile Radius Map

Appendix C

ESI Site Photographs

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 1 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1000.

DIRECTION OF PHOTOGRAPH:
> N .

WEATHER CONDITIONS:
> partly cloudy
> cool .

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS1 .

DESCRIPTION: > soil sample SS1 background .
>

DATE: > 3-31-93

TIME: > 1300.

DIRECTION OF PHOTOGRAPH:
> W .

WEATHER CONDITIONS:
> partly cloudy
> cool .

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> FB .

DESCRIPTION: > Field blank sample .
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 2 OF 35

U.S. EPA ID NO.: **981189905**

DATE: >3/31/93

TIME: > 1030.

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>partly cloudy
> cool

PHOTOGRAPHED BY:
>Cindy Fairbanks

SAMPLE ID (if applicable):
> SS-2

DESCRIPTION: > Soil sample SS-2 background.
>

DATE: >3/31/93

TIME: > 1030.

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>partly cloudy
> cool

PHOTOGRAPHED BY:
>Cindy Fairbanks

SAMPLE ID (if applicable):
> SS2

DESCRIPTION: > Location of Soil sample SS-2 background
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 3 OF 35

U.S. EPA ID NO.: 981189905

DATE: >3-31-93

TIME: >1336

DIRECTION OF PHOTOGRAPH:
> S

WEATHER CONDITIONS:
>partly cloudy
> cool

PHOTOGRAPHED BY:
>Cindy Fairbanks

SAMPLE ID (if applicable):
> SS3

DESCRIPTION: > soil Sample SS3

DATE: >3-31-93

TIME: >1336

DIRECTION OF PHOTOGRAPH:
> S

WEATHER CONDITIONS:
>partly cloudy
> cool

PHOTOGRAPHED BY:
>cindy Fairbanks

SAMPLE ID (if applicable):
> SS3

DESCRIPTION: > Location of soil Sample SS3

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 4 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1351

DIRECTION OF PHOTOGRAPH:
> NE

WEATHER CONDITIONS:
> partly cloudy
> cool

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS4

DESCRIPTION: > Soil Sample SS4

DATE: > 3-31-93

TIME: > 1351

DIRECTION OF PHOTOGRAPH:
> NE

WEATHER CONDITIONS:
> partly cloudy.
> cool.

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS4

DESCRIPTION: > Location of soil Sample SS4

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 5 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1406

DIRECTION OF PHOTOGRAPH:
> NW

WEATHER CONDITIONS:
> partly cloudy
> Cool

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS5

DESCRIPTION: > Soil sample SS5

DATE: > 3-31-93

TIME: > 1406

DIRECTION OF PHOTOGRAPH:
> NW

WEATHER CONDITIONS:
> partly cloudy
> Cool

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS5

DESCRIPTION: > Location of soil sample SS5

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1422.

DIRECTION OF PHOTOGRAPH:
> NE

WEATHER CONDITIONS:
> partly cloudy
> cool

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS6

DESCRIPTION: > Soil sample SS6
>

DATE: > 3-31-93

TIME: > 1422.

DIRECTION OF PHOTOGRAPH:
> NE

WEATHER CONDITIONS:
> partly cloudy
> cool

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS6

DESCRIPTION: > Location of soil sample SS6
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 7 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1422.

DIRECTION OF PHOTOGRAPH: >

WEATHER CONDITIONS: > partly cloudy
> cool

PHOTOGRAPHED BY: > cindy Fairbanks

SAMPLE ID (if applicable): > SS6

DESCRIPTION: > view of soil Sample SS6 area.

DATE: > 3-31-93

TIME: > 1422

DIRECTION OF PHOTOGRAPH: >

WEATHER CONDITIONS: > partly cloudy
> cool

PHOTOGRAPHED BY: > cindy Fairbanks

SAMPLE ID (if applicable): > SS6.

DESCRIPTION: > same as above

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 8 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 3-31-93

TIME: > 1437.

DIRECTION OF PHOTOGRAPH:
> SE

WEATHER CONDITIONS:
> partly cloudy
> cool

PHOTOGRAPHED BY:
> cindy Fairbanks

SAMPLE ID (if applicable):
> SS7

DESCRIPTION: > Soil sample SS7

DATE: > 3-31-93

TIME: > 1437.

DIRECTION OF PHOTOGRAPH:
> SE

WEATHER CONDITIONS:
> partly cloudy
> cool

PHOTOGRAPHED BY:
> cindy Fairbanks

SAMPLE ID (if applicable):
> SS7

DESCRIPTION: > View of soil sample SS7 area.

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 9 OF 35.

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1100 .

DIRECTION OF PHOTOGRAPH:
> N .

WEATHER CONDITIONS:
> partly cloudy
> Cool .

PHOTOGRAPHED BY:
Cindy Fairbanks

SAMPLE ID (if applicable):
> SS8 .

DESCRIPTION: > Soil Sample SS8
>

DATE: > 3-31-93

TIME: > 1100 .

DIRECTION OF PHOTOGRAPH:
> N .

WEATHER CONDITIONS:
> partly cloudy
> Cool .

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS8 .

DESCRIPTION: > Location of soil sample 8
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 10 OF 35

U.S. EPA ID NO.: 981189905

DATE: >3-31-93

TIME: > 1115

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>partly cloudy
>Cool

PHOTOGRAPHED BY:
>Cindy Fairbanks

SAMPLE ID (if applicable):
> SS9

DESCRIPTION: > soil sample SS9

DATE: >3-31-93

TIME: > 1115

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>partly cloudy
>Cool

PHOTOGRAPHED BY:
>Cindy Fairbanks

SAMPLE ID (if applicable):
> SS9

DESCRIPTION: > Location of soil sample SS9

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 11 OF 35

U.S. EPA ID NO.: 981189905

DATE: >3-31-93

TIME: > 1130.

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> partly cloudy
> Cool

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS-10

DESCRIPTION: > Soil Sample SS10

DATE: >3-31-93

TIME: > 1130.

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> partly cloudy
> Cool

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS-10

DESCRIPTION: > Location of soil Sample SSB

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 12 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1545.

DIRECTION OF PHOTOGRAPH:
> W .

WEATHER CONDITIONS:
> cloudy, cool

>

PHOTOGRAPHED BY:
> cindy Fairbanks

SAMPLE ID (if applicable):
> SS11 .

DESCRIPTION: > Soil Sample SS11

>

DATE: > 3-31-93

TIME: > 1545.

DIRECTION OF PHOTOGRAPH:
> W .

WEATHER CONDITIONS:
> cloudy, cool

>

PHOTOGRAPHED BY:
> cindy Fairbanks

SAMPLE ID (if applicable):
> SS11 .

DESCRIPTION: > Location of soil Sample SS11.

>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 13 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1532.

DIRECTION OF PHOTOGRAPH:
> E .

WEATHER CONDITIONS:
> Cloudy, cool

>

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS12.

DESCRIPTION: > Soil Sample SS12
>

DATE: > 3-31-93

TIME: > 1532

DIRECTION OF PHOTOGRAPH:
> E .

WEATHER CONDITIONS:
> Cloudy, cool

>

PHOTOGRAPHED BY:
> Cindy Fairbanks

SAMPLE ID (if applicable):
> SS12.

DESCRIPTION: > Location of soil Sample SS12
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 14 OF 35.

U.S. EPA ID NO.: **981189905**

DATE: > 3-31-93

TIME: > 1230.

DIRECTION OF PHOTOGRAPH:
> N.

WEATHER CONDITIONS:
> partly cloudy
> cool.

PHOTOGRAPHED BY:
> cindy Fairbanks

SAMPLE ID (if applicable):
> SS13.

DESCRIPTION: > Soil sample SS13
>

DATE: > 3-31-93

TIME: > 1230.

DIRECTION OF PHOTOGRAPH:
> N.

WEATHER CONDITIONS:
> partly cloudy
> cool.

PHOTOGRAPHED BY:
> cindy Fairbanks

SAMPLE ID (if applicable):
> SS13.

DESCRIPTION: > Location of soil sample SS13
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 13 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 3-31-93

TIME: > 1105

DIRECTION OF PHOTOGRAPH:
> S

WEATHER CONDITIONS:
> Mostly cloudy

> 50°F

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW1/SD1

DESCRIPTION: > surface water/sediment Sample SW1/SD1

DATE: > 3-31-93

TIME: > 1105

DIRECTION OF PHOTOGRAPH:
> S

WEATHER CONDITIONS:
> Mostly cloudy

> 50°F

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW1/SD1

DESCRIPTION: > Location of SW1/SD1

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 16 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 3-31-93

TIME: > 1105

DIRECTION OF PHOTOGRAPH:
>

WEATHER CONDITIONS:
> Mostly cloudy

> 50 °F

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
>

DESCRIPTION: > View of SA1 / SD1 area

DATE: > 3-31-93

TIME: > 1105

DIRECTION OF PHOTOGRAPH:
> F

WEATHER CONDITIONS:
> Mostly cloudy

> 50 °F

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
>

DESCRIPTION: > Same as above

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 17 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 945 . 955

DIRECTION OF PHOTOGRAPH:
> N .

WEATHER CONDITIONS:
> Mostly cloudy
> 50°F .

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW2/SD2

DESCRIPTION: > Surface water sample/sediment sample SW2/SD2

DATE: > 3-31-93

TIME: > 945 . 955

DIRECTION OF PHOTOGRAPH:
> N .

WEATHER CONDITIONS:
> Mostly cloudy
> 50°F .

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW2/SD2

DESCRIPTION: > Location of SW2/SD2

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 18 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 955

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> Mostly cloudy
> 50°F

PHOTOGRAPHED BY:
>

SAMPLE ID (if applicable):
>

DESCRIPTION: > Views of SW2 / SD2 area

DATE: > 3-31-93

TIME: > 955

DIRECTION OF PHOTOGRAPH:
> E

WEATHER CONDITIONS:
> Mostly cloudy
> 50°F

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
>

DESCRIPTION: > Same as above

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 19 OF 35.

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1225.

DIRECTION OF PHOTOGRAPH:
>

WEATHER CONDITIONS:
> partly cloudy
> Hazy 55°F

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW3/SD3

DESCRIPTION: > Surface water sample/sediment sample SW3/SD3

DATE: > 3-31-93

TIME: > 1225.

DIRECTION OF PHOTOGRAPH:
>

WEATHER CONDITIONS:
> partly cloudy
> Hazy 55°F

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW3/SD3

DESCRIPTION: > Location of SW3/SD3

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 20 OF 35.

U.S. EPA ID NO.: 981189905

DATE: > 3-31-93

TIME: > 1155/1205

DIRECTION OF PHOTOGRAPH:
> E .

WEATHER CONDITIONS:
> Partly cloudy
> 55°F .

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW4/SD4

DESCRIPTION: > surface water sample/sediment sample. SW4/SD4

DATE: > 3-31-93

TIME: > 1155/1205

DIRECTION OF PHOTOGRAPH:
> E .

WEATHER CONDITIONS:
> partly cloudy
> 55°F .

PHOTOGRAPHED BY:
> Joe Walczak

SAMPLE ID (if applicable):
> SW4/SD4

DESCRIPTION: > Location of SW4/SD4

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 21 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 3/31/93

TIME: > 12a5

DIRECTION OF PHOTOGRAPH: >

WEATHER CONDITIONS: > Partly cloudy

> 55°F

PHOTOGRAPHED BY: > Joe Walczak

SAMPLE ID (if applicable): >

DESCRIPTION: > view of SW4/SD4 area

DATE: > 3-31-93

TIME: > 12a5

DIRECTION OF PHOTOGRAPH: >

WEATHER CONDITIONS: > partly cloudy

> 55°F

PHOTOGRAPHED BY: > Joe Walczak

SAMPLE ID (if applicable): >

DESCRIPTION: > View of SW4/SD4 area

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 22 OF 35

U.S. EPA ID NO.: **981189905**

DATE: >3-31-93

TIME: >1400/1410

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>Mostly cloudy
>50 °F

PHOTOGRAPHED BY:
>Joe Walczak

SAMPLE ID (if applicable):
>SW5/SD5

DESCRIPTION: > surface water sample/sediment sample SW5/SD5

DATE: >3-31-93

TIME: >1400/1410

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>Mostly cloudy
>50 °F

PHOTOGRAPHED BY:
>Joe Walczak

SAMPLE ID (if applicable):
>SW5/SD5

DESCRIPTION: > Location of SW5/SD5

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 23 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 3-31-93

TIME: > 1430/1445

DIRECTION OF PHOTOGRAPH:
> W

WEATHER CONDITIONS:
> cloudy windy
> 50°F

PHOTOGRAPHED BY:
> Joe walczak

SAMPLE ID (if applicable):
> SW6/SD6.

DESCRIPTION: > surface water sample / sediment sample SW6 / SD6

DATE: > 3-31-93

TIME: > 1430/1445

DIRECTION OF PHOTOGRAPH:
> W

WEATHER CONDITIONS:
> cloudy windy
> 50°F

PHOTOGRAPHED BY:
> Joe walczak

SAMPLE ID (if applicable):
> SW6/SD6

DESCRIPTION: > Location of SW6 / SD6

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 24 OF 35

U.S. EPA ID NO.: **981189905**

DATE: >3-31-93

TIME: >1445

DIRECTION OF PHOTOGRAPH:
>

WEATHER CONDITIONS:
>Cloudy windy
> 50 °F

PHOTOGRAPHED BY:
>Joe Walczak

SAMPLE ID (if applicable):
>

DESCRIPTION: > View of SW6/SD6 area
>

DATE: >3-31-93

TIME: > 1445.

DIRECTION OF PHOTOGRAPH:
>

WEATHER CONDITIONS:
> Cloudy windy
> 50 °F

PHOTOGRAPHED BY:
>Joe Walczak

SAMPLE ID (if applicable):
>

DESCRIPTION: > same as above
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 25 OF 35

U.S. EPA ID NO.: **981189905**

DATE: >3-31-93

TIME: >1505/1520

DIRECTION OF PHOTOGRAPH:
> E

WEATHER CONDITIONS:
>cloudy windy
>50°F

PHOTOGRAPHED BY:
>Joe walczak

SAMPLE ID (if applicable):
> SW7/SD7

DESCRIPTION: > surface water sample/sediment sample SW7/SD7

DATE: >3-31-93

TIME: >1505/1520

DIRECTION OF PHOTOGRAPH:
> E

WEATHER CONDITIONS:
>cloudy windy
> 50°F

PHOTOGRAPHED BY:
>Joe walczak

SAMPLE ID (if applicable):
> SW7-SD7

DESCRIPTION: > Location of SW7/SD7

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 26 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 3-31-93

TIME: > 1615/1630

DIRECTION OF PHOTOGRAPH:
> E

WEATHER CONDITIONS:
> cloudy windy
> 50 °F

PHOTOGRAPHED BY:
> Joe walczak

SAMPLE ID (if applicable):
> SW8/SD8.

DESCRIPTION: > surface water sample/sediment sample SW8/SD8

DATE: > 3-31-93

TIME: > 1615/1630

DIRECTION OF PHOTOGRAPH:
> E

WEATHER CONDITIONS:
> cloudy windy
> 50 °F

PHOTOGRAPHED BY:
> Joe walczak

SAMPLE ID (if applicable):
> SW8/SD8

DESCRIPTION: > Location of SW8/SD8

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 27 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 3-31-93

TIME: >

DIRECTION OF PHOTOGRAPH:
>

WEATHER CONDITIONS:
> cloudy windy
> 50 °F

PHOTOGRAPHED BY:
>

SAMPLE ID (if applicable):
>

DESCRIPTION: > view of SW8/SD8 area
>

DATE: > 3-31-93

TIME: >

DIRECTION OF PHOTOGRAPH:
>

WEATHER CONDITIONS:
> cloudy windy
> 50 °F

PHOTOGRAPHED BY:
>

SAMPLE ID (if applicable):
>

DESCRIPTION: > same as above
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 28 OF 35

U.S. EPA ID NO.: **981189905**

DATE: >3-31-93

TIME: >1620/1630

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>cloudy cool
> 50 °F

PHOTOGRAPHED BY:
>cindy Fairbanks

SAMPLE ID (if applicable):
> SW9/SD9

DESCRIPTION: > surface water sample/sediment sample SW9/SD9

DATE: >3-31-92

TIME: >1620/1630

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
>cloudy cool
> 50 °F.

PHOTOGRAPHED BY:
>cindy Fairbanks

SAMPLE ID (if applicable):
>SW9/SD9

DESCRIPTION: > Location of SW9/SD9

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 29 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 5-6-93

TIME: > 1340

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
> MW1

DESCRIPTION: > Monitoring well Sample MW1

DATE: > 5-6-93

TIME: > 1340

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
> MW1

DESCRIPTION: > Location of MW1 Sample

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 30 OF 35

U.S. EPA ID NO.: **981189905**

DATE: > 5-6-93

TIME: > 1340.

DIRECTION OF PHOTOGRAPH:
> S

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
>

DESCRIPTION: > View of MW1 Sample area
>

DATE: > 5-6-93

TIME: > 1340.

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F.

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
>

DESCRIPTION: > Same as above
>

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL

U.S. EPA ID NO.: 981189905

DATE: > 5-5-93

TIME: > 1400.

DIRECTION OF PHOTOGRAPH:
> S

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
> MW2

DESCRIPTION: > Monitoring well sample MW2

DATE: > 5-5-93

TIME: > 1400.

DIRECTION OF PHOTOGRAPH:
> S

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
>

DESCRIPTION: > Location of MW2 sample

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 32 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 5-5-93.

TIME: > 1245.

DIRECTION OF PHOTOGRAPH:
> N.

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F.

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
> MW4.

DESCRIPTION: > Monitoring well sample MW4

DATE: > 5-5-93

TIME: > 1245.

DIRECTION OF PHOTOGRAPH:
> N.

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F.

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
> MW4.

DESCRIPTION: > Location of MW4

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL

U.S. EPA ID NO.: 981189905

DATE: > 5-6-93

TIME: > 1300

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
> MW4D

DESCRIPTION: > Monitoring well sample MW4

DATE: > 5-6-93

TIME: > 1300

DIRECTION OF PHOTOGRAPH:
> N

WEATHER CONDITIONS:
> Mostly Sunny
> 75°F

PHOTOGRAPHED BY:
> Nabil Seif

SAMPLE ID (if applicable):
> MW4D

DESCRIPTION: > Location of MW4D

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: COOPER SCHOOL PAGE 34 OF 35

U.S. EPA ID NO.: 981189905

DATE: > 5-5-93

TIME: > 1045.

DIRECTION OF PHOTOGRAPH: > E .

WEATHER CONDITIONS: > Mostly Sunny

> 75°F .

PHOTOGRAPHED BY: > Nabil Seif

SAMPLE ID (if applicable): > MW6 .

DESCRIPTION: > Monitoring well sample MW6

DATE: > 5-5-93

TIME: > 1045.

DIRECTION OF PHOTOGRAPH: > E .

WEATHER CONDITIONS: > Mostly Sunny

> 75°F .

PHOTOGRAPHED BY: > Nabil Seif

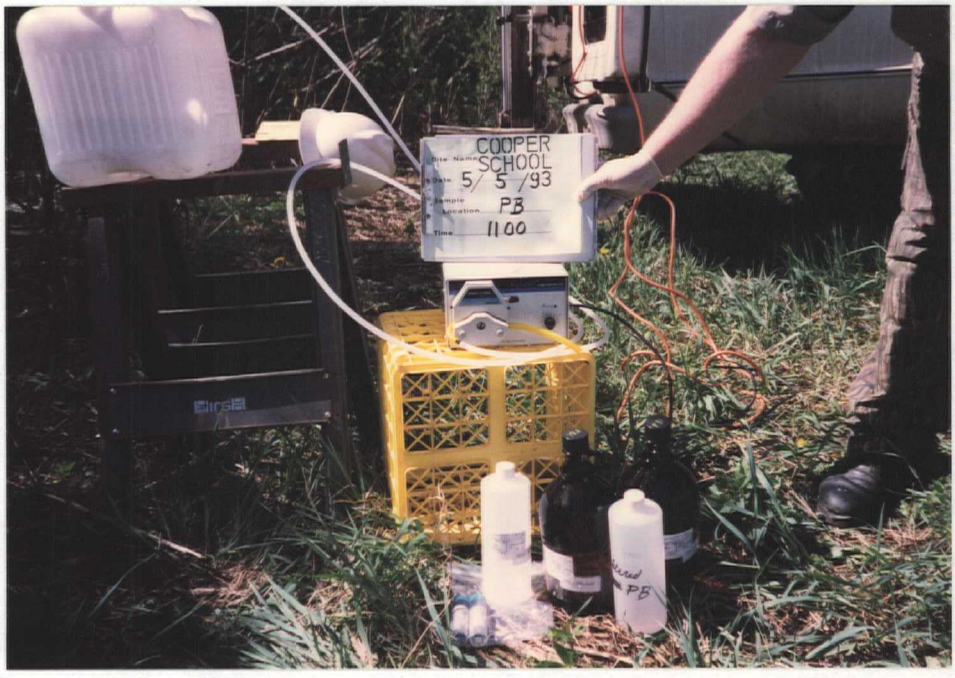
SAMPLE ID (if applicable): > MW6 .

DESCRIPTION: > Location of MW6 sample

FIELD PHOTOGRAPHY LOG SHEET

SITE NAME: **COOPER SCHOOL** PAGE 35 OF 35

U.S. EPA ID NO.: **981189905**



DATE: > 5-5-93

TIME: > 1100

DIRECTION OF PHOTOGRAPH: > E

WEATHER CONDITIONS: > Mostly Sunny
> 75°F

PHOTOGRAPHED BY: > Nabil Seif

SAMPLE ID (if applicable): > PB

DESCRIPTION: > pump blank sample PB

DATE: > 5-5-93

TIME: > 1200

DIRECTION OF PHOTOGRAPH: > S

WEATHER CONDITIONS: > Mostly Sunny
> 75°F

PHOTOGRAPHED BY: > Nabil Seif

SAMPLE ID (if applicable): >

DESCRIPTION: > view of cooper School

Appendix D

Chemical Analysis Data

of

ESI Collected Samples

eder associates
consulting engineers, p. c.

OFFICES:
Locust Valley, NY
Madison, WI
Ann Arbor, MI
Augusta, GA
Jacksonville, FL
Trenton, NJ

August 25, 1993
File #720-27

George Carpenter
Environmental Quality Analyst
Superfund Section
Environmental Response Division
Michigan Department of Natural Resources
Knapp's Office Centre
Lansing, Michigan 48909

Re: EPA Case #19682 Data Validation Report

Dear Mr. Carpenter:

Enclosed is one copy of our Data Validation Report for EPA Case #19682 for your review.

Please call if you have any questions or concerns.

Very truly yours,

EDER ASSOCIATES CONSULTING ENGINEERS, P.C.

KVlahogiani

Konstadina Vlahogiani
Project Manager

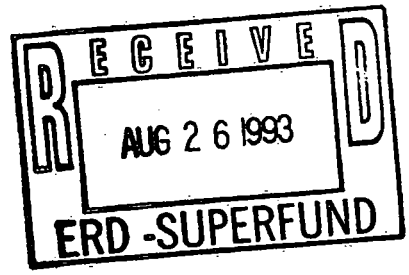
KV/cw

L082593a.GC

1st NAT'L. BLDG., 201 S. MAIN ST., 3rd FLOOR, ANN ARBOR, MI 48104 • (313) 663-2144 • FAX (313) 747-6530

MICHIGAN DEPARTMENT OF

NATURAL RESOURCES



DATA VALIDATION REPORT

EPA CASE #19682

MICHIGAN DEPARTMENT OF

NATURAL RESOURCES

SAMPLED MARCH 31, 1993

AUGUST 1993

FILE #720-27

EDER ASSOCIATES CONSULTING ENGINEERS, P.C.

Ann Arbor, Michigan

Locust Valley, New York

Madison, Wisconsin

Augusta, Georgia

Trenton, New Jersey

Jacksonville, Florida

INTRODUCTION

This report summarizes the data validation efforts of Eder Associates Consulting Engineers, P.C. (Eder) for soil and water samples collected by the Michigan Department of Natural Resources (MDNR) on March 31, 1993, for EPA Case #19682. Twenty-two soil samples and eleven water samples were submitted for Contract Laboratory Program (CLP) Routine Analytical Services (RAS) for both the Target Compound List (TCL) and the Target Analyte List (TAL) parameters. Due to the large number of soil samples present in this case, the soil samples were divided in two sample delivery groups (SDGs) as required by the Statement of Work (SOW). RAS organic services were provided by Southwest Research Institute and RAS inorganic services were provided by Skinner and Sherman Laboratories, Inc. Eder personnel validated all results. The samples included in this case are:

SOILS/SEDIMENTS

Sample Number	Organic Traffic Report Number	Inorganic Traffic Report Number
SS1	ENZ50	MENY50
SS2	ENZ51	MENY51
SS3	ENZ52	MENY52
SS4	ENZ53	MENY53
SS5	ENZ54	MENY54
SS6	ENZ55	MENY55
SS7	ENZ56	MENY56
SS8	ENZ57	MENY57
SS9	ENZ58	MENY58
SS10	ENZ59	MENY59
SS11	ENZ60	MENY60
SS12	ENZ61	MENY61
SS13	ENZ62	MENY62
SD1	ENZ65	MENY65
SD2	ENZ66	MENY66
SD3	ENZ67	MENY67
SD4	ENZ68	MENY68

SOILS/SEDIMENTS,CONTINUED

Sample Number	Organic Traffic Report Number	Inorganic Traffic Report Number
SD5	ENZ69	MENY69
SD6	ENZ70	MENY70
SD7	ENZ71	MENY71
SD8	ENZ72	MENY72
SD9	ENZ73	MENY73

WATERS

Sample Number	Organic Traffic Report Number	Inorganic Traffic Report Number
SW1	ENZ74	MENY74
SW2	ENZ75	MENY75
SW3	ENZ76	MENY76
SW4	ENZ77	MENY77
SW5	ENZ78	MENY78
SW6	ENZ79	MENY79
SW7	ENZ80	MENY80
SW7D	ENZ81	MENY81
SW8	ENZ82	MENY82
SW9	ENZ83	MENY83
FB1	ENZ91	MENY91

Data validation was conducted according to guidelines found in the USEPA guidance documents National Functional Guidelines for Organic Data Review (Draft), December, 1990 (Revised June, 1991) and Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, July 1, 1988.

DATA VALIDATION SUMMARY

Organics

Twenty soil samples (SS1 through SS13, and SD1 through SD7) were assigned to sample delivery group ENZ50. These samples were analyzed by Southwest Research Institute for the RAS TCL organic parameter list. The data is acceptable for use as qualified below.

Volatiles (RAS Soils - SDG#ENZ50)

- The percent relative standard deviations of several compounds were above the control limit in one initial calibration. The only compound detected in any of the samples was acetone. All detections of this compound, however, were negated due to blank contamination. No further qualification of the data is required.
- The percent differences between initial and continuing calibration relative response factors of several compounds were above the control limit in various continuing calibrations. The only compound detected in any of the samples was acetone. All detections of this compound, however, were negated due to blank contamination. No further qualification of the data is required.
- Acetone was detected in various laboratory blanks. This compound is a common laboratory contaminant. Therefore, all detections of this compound in associated samples were qualified as non-detect (U) if their concentration was less than or equal to 10 times the concentration in the associated blank.
- 2-butanone and 2-hexanone were detected in one laboratory blank. These compounds were not detected in any of the samples. Therefore, no qualification of the data is required.
- No trip blanks were submitted.

Semi-volatiles (RAS Soils - SDG#ENZ50)

- The percent differences between initial and continuing calibration relative response factors of several compounds were above the control limit in various continuing calibrations. None of these compounds were detected in any of the samples, therefore, no qualification of the data is required.

- The method blank contained two tentatively identified compounds (TICs) identified only as unknowns of molecular weight 112. All detections of these TICs in the samples were qualified as non-detect (U) if their concentration was less than or equal to five times the concentration in the blank.

- One internal standard area was below the lower control limits for the original analyses and the reanalyses of samples SD4 and SD7. The original analyses results for both samples were used in the validation summary table. All detections calculated from the out of compliance internal standard in these samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ). The affected compounds for these samples are: di-n-octylphthalate; benzo(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; indeno(1,2,3-cd)pyrene; dibenzo(a,h)anthracene; and benzo(g,h,i)perylene.

- The TIC data sheet for samples SS3, SS4, and SS7 contained compounds from the pesticide target compound list. These compounds were not included as TICs in the validation summary table.

Pesticides (RAS Soils - SDG#ENZ50)

- beta-BHC, delta-BHC, Heptachlor epoxide, Endosulfan I, 4,4'-DDE, alpha-Chlordane, and gamma-Chlordane were detected in the method blank at below CRQL levels. All detections of these compounds in the samples were qualified as non-detect (U) if their concentration was less than or equal to five times the concentration in the blank.

- One surrogate recovery was slightly below the lower advisory limit on one analytical column for samples SS1, SS6, SS13, and SD2. No qualification of the data is required.

- One or more surrogate recoveries were below the lower advisory limit on at least one or both analytical columns for samples SS8, SS12, SD1, SD3, and SD6. Therefore, all detections in these samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ). Results taken from the dilutions of these samples were used unqualified.

- One surrogate recovery was zero on one GC column and the other surrogate recoveries were below the lower advisory limit on both GC columns for

samples SD4 and SD5. All detections in these samples were qualified as estimated (J) and all non-detections were qualified as unusable (R).

- Several compounds detected in the samples were qualified by the laboratory with a "P" due to the difference between the concentrations calculated on the two analytical columns. Detections which had percent differences above the control limit were qualified as estimated (J).

- The laboratory incorrectly qualified results for 4,4'-DDE, Endosulfan II, Methoxychlor, and Endrin aldehyde in sample SD1 with a "P" qualifier. The difference between the concentrations calculated on the two analytical columns for these compounds were below 25 percent, therefore, this qualifier was not required.

- Endrin aldehyde was not detected in the primary dilution of sample SS4 but it was detected in the secondary dilution of this sample. The detection for Endrin aldehyde in sample SS4 was qualified as non-detect (U) at the associated level in the validation summary table.

- The detections for alpha-BHC in samples SS8 and SS13 were outside the retention time window on one analytical column but the laboratory reported these detections. The detections for alpha-BHC in samples SS8 and SS13 were qualified as non-detect (U) at the associated level in the validation summary table.

- The detection for 4,4'-DDE in the primary dilution of sample SS4 was slightly outside the retention time window on one analytical column. Therefore, the laboratory did not report this detection. The detection of this compound in the secondary dilution of this sample, however, was within the retention time window and the laboratory reported the detection. This detection was also confirmed by GC/MS analysis. The 4,4'-DDE result from the secondary dilution of sample SS4 was added in the validation summary table.

- 4,4'-DDT was detected in the original analysis of sample SS8 at a concentration above the calibration range. This sample was reanalyzed as a ten-fold dilution but 4,4'-DDT was not detected in the sample dilution. This compound was present in the sample dilution but slightly outside the retention time window on one analytical column. The concentration of 4,4'-DDT in the dilution of sample SS8 was calculated and added in the validation summary table.

- The retention time windows for one analytical column were incorrect on forms 10A and 10B (pesticide identification summary) for sample SD6. The results for this sample were not affected.

- Samples SS3, SS4, SS5, SS7, and SS9 analyzed only as primary and secondary dilutions due to high levels of target compounds. The quantitation limits for undetected compounds in these samples were raised according to the dilution factors.

Two soil samples (SD8 and SD9) were assigned to sample delivery group ENZ72. These samples were analyzed by Southwest Research Institute for the RAS TCL organic parameter list. The data is acceptable for use as qualified below.

Volatiles (RAS Soils - SDG#ENZ72)

- The percent differences between initial and continuing calibration relative response factors of two compounds were above the control limit in the continuing calibration. None of these compounds were detected in any of the samples. Therefore, no qualification of the data is required.

- Acetone was detected in the laboratory blank. This compound was not detected in any of the samples, therefore, no qualification of the data is required.

- No trip blanks were submitted.

Semi-volatiles (RAS Soils - SDG#ENZ72)

- The percent differences between initial and continuing calibration relative response factors of several compounds were above the control limit in various continuing calibrations. None of these compounds were detected in any of the samples, therefore, no qualification of the data is required.

- The method blank contained two tentatively identified compounds (TICs) identified only as unknowns of molecular weight 112. All detections of these TICs in the samples were qualified as non-detect (U) if their concentration was less than or equal to five times the concentration in the blank.

- One internal standard area was below the lower control limits for the original analyses and the reanalyses of samples SD8 and SD9. The original analyses results for both samples were used in the validation summary table. All detections calculated from the out of compliance internal standard in these samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ). The affected compounds for these samples are: di-n-octylphthalate; benzo(b)fluoranthene; benzo(k)fluoranthene;

benzo(a)pyrene; indeno(1,2,3-cd)pyrene; dibenzo(a,h)anthracene; and benzo(g,h,i)perylene.

- The matrix spike recovery for phenol was above the upper advisory limit. The relative percent difference between the matrix spike recoveries was also above the advisory limit for phenol. No qualification of the data is required.

Pesticides (RAS Soils - SDG#ENZ72)

- alpha-Chlordane was detected in the method blank at below CRQL levels. All detections of this compound in the samples were qualified as non-detect (U) if their concentration was less than or equal to five times the concentration in the blank.

- One surrogate recovery was slightly below the lower advisory limit on one analytical column for sample SD8. No qualification of the data is required.

- Several compounds detected in the samples were qualified by the laboratory with a "P" due to the difference between the concentrations calculated on the two analytical columns. Detections which had percent differences above the control limit were qualified as estimated (J).

Eleven water samples (SW1 through SW9, SW7D, and FB1) were assigned to sample delivery group ENZ74. These samples were analyzed by Southwest Research Institute for the RAS TCL organic parameter list. The data is acceptable for use as qualified below.

Volatiles (RAS Waters - SDG#ENZ74)

- The sample log-in sheet and the case narrative noted that the vials of samples SW4 and SW7 contained headspace and one vial of sample SW6 was received broken. All detections in samples SW4 and SW7 were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ). The validators assumed that the laboratory used the undamaged vial of sample SW6 for the analysis of this sample, therefore, results for sample SW6 were not qualified.

- The percent relative standard deviation of one compound was above the control limit in the initial calibration. This compound was not detected in any of the samples, therefore, no qualification of the data is required.

- The percent differences between initial and continuing calibration relative response factors of several compounds were above the control limit in the continuing calibration. None of these compounds were detected in any of the samples, therefore, no qualification of the data is required.

- Acetone was detected in the field blank. This compound is a common laboratory contaminant. Therefore, all detections of this compound in the samples were qualified as non-detect (U) if their concentration was less than or equal to 10 times the concentration in the blank.

- No trip blanks were submitted.

Semi-volatiles (RAS Waters - SDG#ENZ74)

- The percent differences between initial and continuing calibration relative response factors of several compounds were above the control limit in the continuing calibration. The only compound detected in any of the samples was carbazole. Therefore, all detections of this compound in the samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ).

- The method and field blanks contained low levels of bis(2-ethylhexyl)phthalate, a common laboratory contaminant. All detections of this compound in the samples were qualified as non-detect (U) if their concentration was less than or equal to 10 times the concentration in the highest blank.

- The method blank contained one TIC identified only as unknown. This TIC was also detected in all samples.

- The matrix spike duplicate recovery for 4-chloro-3-methylphenol was above the upper advisory limit. No qualification of the data is required.

Pesticides (RAS Waters - SDG#ENZ74)

- The field blank contained low levels (below CRQL) of gamma-BHC (Lindane). This compound was not detected in any of the samples, therefore, no qualification of the data is required.

- One or more surrogate recoveries were below the lower advisory limit on at least one or both analytical columns for all samples. All detections in the samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ).

- Several compounds detected in various samples were qualified by the laboratory with a "P" due to the difference between the concentrations calculated on the two analytical columns. Detections which had percent differences above the control limit were qualified as estimated (J).

Inorganics (RAS Soils - SDG#MENY50)

Twenty soil samples (SS1 through SS13, and SD1 through SD7) were assigned to sample delivery group MENY50. These samples were analyzed by Skinner and Sherman Laboratories, Inc. for the RAS TAL inorganic parameter list. The data is acceptable for use as qualified below.

- Iron, lead, potassium, sodium, and zinc were detected in the preparation blank. Therefore, all samples with concentrations less than five times the level in the blank were qualified as non-detect (U) at the associated reporting level.
- Calcium, chromium, iron, mercury, nickel, and vanadium demonstrated a negative drift in various laboratory blanks. Therefore, all non-detections of these analytes in the samples were qualified as having estimated detection limits (UJ).
- Iron was detected in various laboratory blanks. The concentration of this analyte in the samples was higher than five times the level in the highest associated blank. Therefore, no qualification of the data is required.
- The ICP Interference Check Sample (ICS) analysis gave results above the IDL for sodium which was not present in the ICS solution. The concentrations of interferents in the samples were found to be less than their respective concentrations in the ICS, therefore, no qualification of the data is required.
- The matrix spike recoveries for antimony and arsenic were below the lower control limit. Therefore, all detections of these analytes in the samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ).
- The relative percent difference between laboratory duplicate analyses was above the control limit for calcium. All detections of this analyte in the samples were qualified as estimated (J).
- The ICP serial dilution results for zinc were above the control limit. All detections of this analyte in the samples were qualified as estimated (J).
- Selenium results for samples SS1, SS3, SS7, SS9, SS10, SS11, SS12, SD1, SD4, SD6, and SD7 were qualified as estimated due to furnace Quality Control (Q.C.), which was not within control limits.
- Thallium results for samples SS7, SS8, and SS12 were qualified as estimated due to furnace Q.C., which was not within control limits.

- All compounds detected between the instrument detection limit and the contract required detection limit, not already qualified as non-detect due to blank contamination, were qualified as estimated (J).

Inorganics (RAS Soils - SDG#MENY72)

Two soil samples (SD8 and SD9) were assigned to sample delivery group MENY72. These samples were analyzed by Skinner and Sherman Laboratories, Inc. for the RAS TAL inorganic parameter list. The data is acceptable for use as qualified below.

- The correlation coefficient for the calibration curve of selenium analyses was below 0.995. Therefore, all detections of this analyte in the samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ).

- Calcium, chromium, iron, sodium, and zinc were detected in the preparation blank. Therefore, all samples with concentrations less than five times the level in the blank were qualified as non-detect (U) at the associated reporting level.

- Iron demonstrated a negative drift in various laboratory blanks. All samples had iron detections above the CRDL, therefore, no qualification of the data is required.

- Aluminum, calcium, chromium, and zinc were detected in various laboratory blanks. The concentration of these analytes in the samples were higher than five times the level in the highest associated blank. Therefore, no qualification of the data is required.

- Antimony was detected in one laboratory blank. This analyte was not detected in any of the samples, therefore, no qualification of the data is required.

- The ICP Interference Check Sample (ICS) analysis gave results above the IDL for sodium which was not present in the ICS solution. The concentrations of interferents in the samples were found to be less than their respective concentrations in the ICS, therefore, no qualification of the data is required.

- The matrix spike recovery for barium was above the upper control limit. Therefore, all detections of this analyte in the samples were qualified as estimated (J).

- The matrix spike recoveries for antimony, arsenic, and selenium were below the lower control limit. Therefore, all detections of these analytes in the samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ).

- The matrix spike recovery for thallium was zero. Therefore, all detections of this analyte in the samples were qualified as estimated (J) and all non-detections were qualified as unusable (R).

- The relative percent difference between laboratory duplicate analyses was above the control limit for magnesium. All detections of this analyte in the samples were qualified as estimated (J).

- Selenium results for all samples were qualified as estimated due to furnace Q.C., which was not within control limits.

- All compounds detected between the instrument detection limit and the contract required detection limit, not already qualified as non-detect due to blank contamination, were qualified as estimated (J).

Inorganics (RAS Waters - SDG#MENY74)

Eleven water samples (SW1 through SW9, SW7D, and FB1) were assigned to sample delivery group MENY74. These samples were analyzed by Skinner and Sherman Laboratories, Inc. for the RAS TAL inorganic parameter list. The data is acceptable for use as qualified below.

- The correlation coefficient for the calibration curve of lead analyses was below 0.995. Therefore, all detections of this analyte in the samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ).

- Aluminum, copper, iron, sodium, and zinc were detected in the preparation blank. Therefore, all samples with concentrations less than five times the level in the blank were qualified as non-detect (U) at the associated reporting level.

- Aluminum, barium, calcium, copper, iron, manganese, zinc, and vanadium were detected in various laboratory blanks. Therefore, associated samples with concentrations less than five times the level in the highest associated blank were qualified as non-detect (U) at the associated reporting level.

- The ICP Interference Check Sample (ICS) analysis gave results above the IDL for sodium which was not present in the ICS solution. The concentrations of sodium in the samples were found to be significantly higher than their respective concentrations in the ICS, therefore, no qualification of the data is required.

- The ICP serial dilution results for barium were above the control limit. All detections of this analyte in the samples were qualified as estimated (J).

- Arsenic results for sample SW1 were qualified as estimated due to furnace Q.C., which was not within control limits.

- Lead results for samples SW6 and SW7D were qualified as estimated due to furnace Q.C., which was not within control limits.

- Selenium results for samples SW4 and SW9 were qualified as estimated due to furnace Q.C., which was not within control limits.

- Thallium results for all samples, except SW4 and FB1, were qualified as estimated due to furnace Q.C., which was not within control limits.

- Mercury was detected at a concentration of 0.10 μg/L in samples SW1, SW4, and SW7D. The laboratory, however, reported this analyte as non-detect in these samples. The mercury detections for these samples were added in the validation summary table.

- All compounds detected between the instrument detection limit and the contract required detection limit, not already qualified as non-detect due to blank contamination, were qualified as estimated (J).

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SS1	SS2	SS3	SS4	SS5	SS6
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ50	ENZ51	ENZ52	ENZ53	ENZ54	ENZ55
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatile Organics						
Acetone		26 U	13 U			
Semi-volatile Organics						
Phenol				400 J	570	
4-Methylphenol		38 J				
Naphthalene						
2-Methylnaphthalene						
Dimethylphthalate						
Acenaphthylene						
Acenaphthene						
Dibenzofuran						
Fluorene						
Hexachlorobenzene				440		
Phenanthrene	38 J	25 J	27 J	63 J	41 J	18 J
Anthracene						
Carbazole						
Di-n-butylphthalate						
Fluoranthene	60 J	33 J	48 J	92 J	47 J	20 J
Pyrene	54 J	40 J	50 J	100 J	48 J	19 J
Butylbenzylphthalate			100 J		37 J	
Benzo(a)anthracene	28 J		21 J	50 J		
Chrysene	42 J	26 J	38 J	81 J	31 J	
bis(2-ethylhexyl)phthalate	33 J	200 J	93 J	220 J	40 J	57 J
Di-n-octylphthalate						
Benzo(b)fluoranthene	67 J	47 J	60 J	160 J	49 J	26 J
Benzo(k)fluoranthene						
Benzo(a)pyrene	26 J			52 J		
Indeno (1,2,3-cd)pyrene						
Dibenz(a,h)anthracene						
Benzo(g,h,i)perylene						
Pesticides/PCBs						
alpha-BHC						
beta-BHC	0.38 J					
delta-BHC	2.2 U		2.8 J	1.8 J		
gamma-BHC(Lindane)						
Heptachlor		0.20 J	43	91	0.78 J	0.31 J
Aldrin			8.2 J	12 J		
Heptachlor epoxide	2.2	2.3 U	310 JC	320 J	120 J	4.2
Endosulfan I						
Dieldrin	3.4 J					2.6 J
4,4'-DDE	10	26	320 J	620 C	50 J	41
Endrin	0.14 J	0.31 J	24 J	48 J	28 J	0.99 J
Endosulfan II		0.038 J				
4,4'-DDD	2.1 J	0.48 J	32 J	39 J		9.7 J
Endosulfan sulfate			1.2 J	3.6 J		
4,4'-DDT	4.0 J	29	7.3 J	52 J		60
Methoxychlor	0.17 J					2.0 J
Endrin aldehyde	2.4 J		18 J	90 U	3.7 J	2.7 J
alpha-Chlordane	9.6 J	2.3 U	1,000 C	1,900 C	520 JC	25 J
gamma-Chlordane	5.8	2.3 U	490 JC	1,100 JC	320	16
Aroclor-1254						

C - Detection confirmed by GC/MS analysis

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SS7	SS8	SS9	SS10	SS11	SS12
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ56	ENZ57	ENZ58	ENZ59	ENZ60	ENZ61
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatile Organics						
Acetone						
Semi-volatile Organics						
Phenol	380 J	770	240 J			
4-Methylphenol				100 J		
Naphthalene		21 J				
2-Methylnaphthalene		52 J				
Dimethylphthalate						
Acenaphthylene						
Acenaphthene						
Dibenzofuran						
Fluorene						
Hexachlorobenzene						
Phenanthrene			66 J	39 J		44 J
Anthracene						
Carbazole						
Di-n-butylphthalate		24 J		28 J		
Fluoranthene	24 J	53 J	120 J	64 J	16 J	61 J
Pyrene	21 J	83 J	120 J	54 J	23 J	82 J
Butylbenzylphthalate						
Benzo(a)anthracene		28 J	56 J	24 J	20 J	30 J
Chrysene	17 J	47 J	88 J	39 J	32 J	44 J
bis(2-ethylhexyl)phthalate	42 J	26 J	72 J	93 J	27 J	
Di-n-octylphthalate						
Benzo(b)fluoranthene	24 J	74 J	170 J	68 J	32 J	74 J
Benzo(k)fluoranthene					26 J	
Benzo(a)pyrene		27 J	90 J		19 J	32 J
Indeno (1,2,3-cd)pyrene			39 J			
Dibenz(a,h)anthracene						
Benzo(g,h,i)perylene						
Pesticides/PCBs						
alpha-BHC		2.0 UJ		0.36 J	0.26 J	UJ
beta-BHC		0.33 J	0.48 J			UJ
delta-BHC		UJ	23 U	2.6 U	1.9 U	2.0 UJ
gamma-BHC(Lindane)		UJ				UJ
Heptachlor	88	UJ				UJ
Aldrin		UJ				UJ
Heptachlor epoxide	120 J	0.92 J	0.47 J	0.56 J	1.9 U	0.99 J
Endosulfan I		UJ	5.6 J	2.6		UJ
Dieldrin		UJ				0.13 J
4,4'-DDE	35 J	78	1,200 C	790 C	79	6.7 J
Endrin	26 J	0.79 J				UJ
Endosulfan II		UJ				UJ
4,4'-DDD	17 J	26 J	110 J	22 J	8.8 J	1.0 J
Endosulfan sulfate		UJ				UJ
4,4'-DDT		69 J	570 C	310	69	11 J
Methoxychlor		1.2 J		1.8 J		0.48 J
Endrin aldehyde	1.2 J	2.1 J	7.2 J	5.9 J	2.0 J	2.5 J
alpha-Chlordane	650 JC	2.0 UJ	23 U	2.6 U	1.9 U	3.9 J
gamma-Chlordane	450 C	2.0 UJ	23 U	2.6 U	1.9 U	2.5 UJ
Aroclor-1254		UJ				UJ

C - Detection confirmed by GC/MS analysis

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SS13	SD1	SD2	SD3	SD4	SD5
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ62	ENZ65	ENZ66	ENZ67	ENZ68	ENZ69
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatile Organics						
Acetone					12 U	15 U
Semi-volatile Organics						
Phenol						690
4-Methylphenol						
Naphthalene				50 J		160 J
2-Methylnaphthalene				39 J	18 J	62 J
Dimethylphthalate			32 J			
Acenaphthylene						33 J
Acenaphthene				130 J	56 J	150 J
Dibenzofuran				110 J	54 J	170 J
Fluorene				170 J	98 J	230 J
Hexachlorobenzene						
Phenanthrene	38 J	230 J	180 J	1,800	840	1,900
Anthracene			34 J	300 J	200 J	450
Carbazole		34 J	36 J	220 J	78 J	250 J
Di-n-butylphthalate						28 J
Fluoranthene	43 J	390 J	280 J	2,900	960	1,900
Pyrene	53 J	370 J	260 J	3,900	1,300	1,800
Butylbenzylphthalate		67 J		1,100	130 J	
Benzo(a)anthracene	25 J	170 J	100 J	1,500	450	1,000
Chrysene	44 J	320 J	180 J	1,900	540	1,000
bis(2-ethylhexyl)phthalate	64 J	140 J	90 J	3,600	630	130 J
Di-n-octylphthalate				280 J	64 J	
Benzo(b)fluoranthene	59 J	670	280 J	2,600	960 J	2,000
Benzo(k)fluoranthene					UJ	
Benzo(a)pyrene	27 J	280 J	110 J	1,200	390 J	940
Indeno (1,2,3-cd)pyrene		190 J	57 J	650 J	200 J	400 J
Dibenz(a,h)anthracene				180 J	84 J	67 J
Benzo(g,h,i)perylene		160 J		690 J	190 J	380 J
Pesticides/PCBs						
alpha-BHC	2.2 U	UJ		3.5 J	R	1.6 J
beta-BHC		UJ		UJ	R	R
delta-BHC	2.2 U	UJ	2.2 U	UJ	R	2.2 J
gamma-BHC(Lindane)		UJ		UJ	R	R
Heptachlor		UJ		UJ	R	0.11 J
Aldrin		UJ		UJ	R	R
Heptachlor epoxide	2.2 U	0.60 J	2.2 U	3.4 J	0.71 J	0.30 J
Endosulfan I		UJ		UJ	R	R
Dieldrin	1.6 J	0.54 J	0.08 J	0.21 J	0.24 J	0.37 J
4,4'-DDE	22	8.7 J	9.5	27 J	5.1 J	12 J
Endrin	0.27 J	0.23 J		7.5 J	1.3 J	1.6 J
Endosulfan II	0.093 J	0.86 J	0.22 J	0.83 J	0.25 J	R
4,4'-DDD	3.1 J	19 J	11	33 J	9.3 J	40 J
Endosulfan sulfate		UJ		UJ	R	R
4,4'-DDT	12	17 J	10	35 J	2.6 J	R
Methoxychlor		2.8 J	0.92 J	UJ	2.2 J	R
Endrin aldehyde	3.1 J	13 J	4.5 J	48 J	12 J	6.1 J
alpha-Chlordane		2.8 UJ	2.2 U	39 J	5.8 J	6.4 J
gamma-Chlordane	2.2 U	2.7 UJ	2.2 U	35 J	6.1 J	5.9 J
Aroclor-1254		UJ		UJ	R	74 J

C - Detection confirmed by GC/MS analysis

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SD6	SD7	SD8	SD9	SW1	SW2
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ70	ENZ71	ENZ72	ENZ73	ENZ74	ENZ75
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/L	µg/L
Volatile Organics						
Acetone		18 U				72 U
Semi-volatile Organics						
Phenol						
4-Methylphenol				99 J		
Naphthalene						
2-Methylnaphthalene						
Dimethylphthalate						
Acenaphthylene						
Acenaphthene	54 J					
Dibenzofuran	46 J					
Fluorene	95 J					
Hexachlorobenzene						
Phenanthrene	1,200	40 J	200 J	21 J		
Anthracene	230 J		25 J			
Carbazole	110 J				UJ	UJ
Di-n-butylphthalate	46 J					
Fluoranthene	1,600	47 J	350 J	41 J		
Pyrene	1,300	42 J	400 J	48 J		
Butylbenzylphthalate	150 J					
Benzo(a)anthracene	670 J		210 J			
Chrysene	940	38 J	250 J	30 J		
bis(2-ethylhexyl)phthalate	400 J		84 J	170 J	10 U	10 U
Di-n-octylphthalate		UJ	UJ	UJ		
Benzo(b)fluoranthene	1,500	59 J	480 J	50 J		
Benzo(k)fluoranthene		UJ	UJ	UJ		
Benzo(a)pyrene	630 J	UJ	240 J	UJ		
Indeno (1,2,3-cd)pyrene	270 J	UJ	110 J	UJ		
Dibenz(a,h)anthracene		UJ	UJ	UJ		
Benzo(g,h,i)perylene	230 J	UJ	89 J	UJ		
Pesticides/PCBs						
alpha-BHC	UJ				UJ	UJ
beta-BHC	UJ	0.59 J			UJ	UJ
delta-BHC	UJ	3.0 U		0.20 J	UJ	UJ
gamma-BHC(Lindane)	UJ				UJ	UJ
Heptachlor	UJ			0.17 J	UJ	UJ
Aldrin	UJ				UJ	UJ
Heptachlor epoxide	0.87 J	3.0 U	0.91 J	0.13 J	UJ	UJ
Endosulfan I	UJ				UJ	UJ
Dieldrin	UJ	0.078 J	0.21 J		UJ	UJ
4,4'-DDE	11 J	20	36	2.0 J	UJ	UJ
Endrin	0.36 J		0.083 J	0.14 J	UJ	UJ
Endosulfan II	UJ		0.34 J	0.094 J	UJ	UJ
4,4'-DDD	4.8 J	21	13	0.18 J	UJ	UJ
Endosulfan sulfate	UJ		0.13 J		UJ	UJ
4,4'-DDT	2.9 J	15	28	0.94 J	UJ	UJ
Methoxychlor	UJ				UJ	UJ
Endrin aldehyde	UJ		5.8 J		UJ	UJ
alpha-Chlordane	5.6 J	3.0 U	2.7 J	2.4 U	UJ	UJ
gamma-Chlordane	5.9 J	3.0 U	2.2 J	0.49 J	UJ	UJ
Aroclor-1254	42 J				UJ	UJ

C – Detection confirmed by GC/MS analysis

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SW3	SW4	SW5	SW6	SW7	SW7D
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ76	ENZ77	ENZ78	ENZ79	ENZ80	ENZ81
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Volatile Organics						
Acetone	32 U	65 UJ	93 U	34 U	61 UJ	79 U
Semi-volatile Organics						
Phenol						
4-Methylphenol						
Naphthalene						
2-Methylnaphthalene						
Dimethylphthalate						
Acenaphthylene						
Acenaphthene	0.5 J					
Dibenzofuran	0.4 J					
Fluorene	0.6 J					
Hexachlorobenzene						
Phenanthrene	8 J					
Anthracene						
Carbazole	2 J	UJ	UJ	UJ	UJ	UJ
Di-n-butylphthalate						
Fluoranthene	10					
Pyrene	8 J				0.8 J	
Butylbenzylphthalate						
Benzo(a)anthracene	2 J					
Chrysene	6 J					
bis(2-ethylhexyl)phthalate	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	0.7 J					
Benzo(b)fluoranthene	7 J					
Benzo(k)fluoranthene						
Benzo(a)pyrene	3 J					
Indeno (1,2,3-cd)pyrene	2 J					
Dibenz(a,h)anthracene						
Benzo(g,h,i)perylene	2 J					
Pesticides/PCBs						
alpha-BHC	UJ	UJ	UJ	UJ	UJ	UJ
beta-BHC	UJ	UJ	UJ	UJ	UJ	UJ
delta-BHC	UJ	UJ	UJ	UJ	UJ	UJ
gamma-BHC(Lindane)	UJ	UJ	UJ	UJ	UJ	UJ
Heptachlor	UJ	UJ	UJ	UJ	UJ	UJ
Aldrin	UJ	UJ	UJ	UJ	UJ	UJ
Heptachlor epoxide	0.004 J	UJ	UJ	UJ	UJ	UJ
Endosulfan I	UJ	UJ	UJ	UJ	UJ	UJ
Dieldrin	UJ	UJ	UJ	UJ	UJ	UJ
4,4'-DDE	0.008 J	UJ	UJ	UJ	UJ	UJ
Endrin	UJ	UJ	UJ	UJ	UJ	UJ
Endosulfan II	0.004 J	UJ	UJ	UJ	UJ	UJ
4,4'-DDD	0.007 J	UJ	UJ	UJ	UJ	UJ
Endosulfan sulfate	UJ	UJ	UJ	UJ	UJ	UJ
4,4'-DDT	0.006 J	UJ	UJ	UJ	UJ	UJ
Methoxychlor	UJ	UJ	UJ	UJ	UJ	UJ
Endrin aldehyde	0.087 J	UJ	UJ	UJ	UJ	UJ
alpha-Chlordane	0.009 J	UJ	UJ	UJ	UJ	UJ
gamma-Chlordane	UJ	UJ	UJ	UJ	UJ	UJ
Aroclor-1254	UJ	UJ	UJ	UJ	UJ	UJ

C – Detection confirmed by GC/MS analysis

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SW8	SW9	FB1
Date Sampled:	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ82	ENZ83	ENZ91
Units:	µg/L	µg/L	µg/L
Volatile Organics			
Acetone		33 U	29
Semi-volatile Organics			
Phenol			
4-Methylphenol			
Naphthalene			
2-Methylnaphthalene			
Dimethylphthalate			
Acenaphthylene			
Acenaphthene			
Dibenzofuran			
Fluorene			
Hexachlorobenzene			
Phenanthrene			
Anthracene			
Carbazole	UJ	UJ	UJ
Di-n-butylphthalate			
Fluoranthene			
Pyrene			
Butylbenzylphthalate			
Benzo(a)anthracene			
Chrysene			
bis(2-ethylhexyl)phthalate	10 U	10 U	0.6 J
Di-n-octylphthalate			
Benzo(b)fluoranthene			
Benzo(k)fluoranthene			
Benzo(a)pyrene			
Indeno (1,2,3-cd)pyrene			
Dibenz(a,h)anthracene			
Benzo(g,h,i)perylene			
Pesticides/PCBs			
alpha-BHC	UJ	UJ	UJ
beta-BHC	UJ	UJ	UJ
delta-BHC	UJ	UJ	UJ
gamma-BHC(Lindane)	UJ	UJ	0.003 J
Heptachlor	UJ	UJ	UJ
Aldrin	UJ	UJ	UJ
Heptachlor epoxide	UJ	UJ	UJ
Endosulfan I	UJ	UJ	UJ
Dieldrin	UJ	UJ	UJ
4,4'-DDE	0.009 J	UJ	UJ
Endrin	UJ	UJ	UJ
Endosulfan II	UJ	UJ	UJ
4,4'-DDD	0.005 J	UJ	UJ
Endosulfan sulfate	UJ	UJ	UJ
4,4'-DDT	0.005 J	UJ	UJ
Methoxychlor	UJ	UJ	UJ
Endrin aldehyde	UJ	UJ	UJ
alpha-Chlordane	0.001 J	UJ	UJ
gamma-Chlordane	UJ	UJ	UJ
Aroclor-1254	UJ	UJ	UJ

C - Detection confirmed by GC/MS analysis

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SS1	SS2	SS3	SS4	SS5	SS6
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ50	ENZ51	ENZ52	ENZ53	ENZ54	ENZ55
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatile TICs						
Unknown (# of detections)						1
Ethanol (ACN)						
Semi-volatile TICs						
Unknown (# of detections)	5	8	6	4	4	9
Unknown Alkane (# of detections)	3	3	2	4	5	5
Unknown Aromatic (# of detections)	3			1	4	
Unknown Halogenated (# of detection						
Unknown Hydrocarbon (# of detection		2	1	2		2
Unknown PAH (# of detections)						
Unknown MW=112	3,000 U	1,000 U	1,200 U		2,000 U	920 U
Unknown MW=112	1,400 U	980 U	890 U	1,100 U	1,500 U	370 U
Unknown MW=220						
Unknown MW=426						
Unknown C10.H18.O						1,000 J
Unknown aromatic C6.H6.CL6			420 J			
Unknown aromatic C7.H8.O2	200 J					
Unknown aromatic C18.H20	180 J					
Unknown aromatic C18.H20	310 J					
Unknown PAH MW=252						
Unknown PAH C15.H24						
Unknown PAH C15.H24						
Unknown Sulfur containing						
Benzene, 1,1'-(3,3-dimethyl-					200 JN	
Benzo[j]fluoranthene						
.beta.-amyrin						
.beta.-amyrin						
Butanoic acid, octyl ester						
Cholesterol						
Copaene						
Dodecane						
Eicosane						
1,4-Etheneopentalene, 1,2,3,5				350 JN		
Friedelin		170 JN				
Heptacosane	320 JN			620 JN	240 JN	
Heptadecane						
Hexachloro -benzene						
Hexacosane	260 JN				210 JN	
Hexadecane						
Hexadecanoic acid		350 JN	410 JN	840 JN	220 JN	170 JN
9-Hexadecenoic acid		170 JN				
1,6-Methano-1H-indene, 2,3,3			960 JN	2,300 JN		
4,7-Methano-1H-indene, 4,5,6			150 JN	190 JN		
Octadecane						
Octadecanoic acid						
Octadecanoic acid, 2-methylpropyl	210 JN		140 JN			
Pentacosane						
Pentadecanoic acid			130 JN			
Propanoic acid, 2-methyl-, 3						
Sulfur, mol. (S8)						
Tetracosane	320 JN				270 JN	
Tetradecanoic acid						
Unresolved Hydrocarbon Complex						

N – Analyst has identified compound based on presumptive evidence

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SS7	SS8	SS9	SS10	SS11	SS12
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ56	ENZ57	ENZ58	ENZ59	ENZ60	ENZ61
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatile TICs						
Unknown (# of detections)	1			1	1	1
Ethanol (ACN)						
Semi-volatile TICs						
Unknown (# of detections)	5	2	5	8	8	6
Unknown Alkane (# of detections)	6	10	7	4	3	4
Unknown Aromatic (# of detections)	3	1	3			
Unknown Halogenated (# of detection						
Unknown Hydrocarbon (# of detection			1	3	3	6
Unknown PAH (# of detections)						
Unknown MW=112	1,400 U	3,000 U	2,300 U	1,600 U	950 U	1,800 U
Unknown MW=112	700 U			540 U	730 U	640 U
Unknown MW=220						
Unknown MW=426						
Unknown C10.H18.O						
Unknown aromatic C6.H6.CL6						
Unknown aromatic C7.H8.O2						
Unknown aromatic C18.H20	89 J					
Unknown aromatic C18.H20	180 J					
Unknown PAH MW=252						
Unknown PAH C15.H24						
Unknown PAH C15.H24						
Unknown Sulfur containing						
Benzene, 1,1'-(3,3-dimethyl-						
Benzo[j]fluoranthene						
.beta.-amyrin						
.beta.-amyrin						
Butanoic acid, octyl ester						
Cholesterol						
Copaene						
Dodecane						
Eicosane		1,000 JN				
1,4-Etheneopentalene, 1,2,3,5						
Friedelin						
Heptacosane		200 JN	250 JN			
Heptadecane						82 JN
Hexachloro -benzene						
Hexacosane		240 JN				
Hexadecane						
Hexadecanoic acid	270 JN		400 JN	520 JN	110 JN	1,000 JN
9-Hexadecenoic acid				260 JN		
1,6-Methano-1H-indene, 2,3,3						
4,7-Methano-1H-indene, 4,5,6						
Octadecane		1,800 JN				
Octadecanoic acid						
Octadecanoic acid, 2-methylpropyl				110 JN		
Pentacosane						
Pentadecanoic acid						
Propanoic acid, 2-methyl-, 3						
Sulfur, mol. (S8)						
Tetracosane		330 JN	180 JN			
Tetradecanoic acid						
Unresolved Hydrocarbon Complex		240,000 J				

N – Analyst has identified compound
based on presumptive evidence

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SS13	SD1	SD2	SD3	SD4	SD5
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ62	ENZ65	ENZ66	ENZ67	ENZ68	ENZ69
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatile TICs						
Unknown (# of detections)	1	1		1	1	2
Ethanol (ACN)						
Semi-volatile TICs						
Unknown (# of detections)	4	9	10	8	7	4
Unknown Alkane (# of detections)	10	4	3	3	6	6
Unknown Aromatic (# of detections)				1		2
Unknown Halogenated (# of detection				1		
Unknown Hydrocarbon (# of detection				1		
Unknown PAH (# of detections)					1	1
Unknown MW=112	1,300 U	3,000 U	2,500 U	14,000 J	8,100 J	5,600 J
Unknown MW=112	560 U	1,500 U	1,500 U	4,700 J	4,000 J	2,000 U
Unknown MW=220						
Unknown MW=426					500 J	
Unknown C10.H18.O						
Unknown aromatic C6.H6.CL6						
Unknown aromatic C7.H8.O2						
Unknown aromatic C18.H20						140 J
Unknown aromatic C18.H20						
Unknown PAH MW=252						
Unknown PAH C15.H24						
Unknown PAH C15.H24						
Unknown Sulfur containing						
Benzene, 1,1'-(3,3-dimethyl-						
Benzo[j]fluoranthene			140 J	690 JN		720 JN
.beta.-amyrin						
.beta.-amyrin						
Butanoic acid, octyl ester						
Cholesterol		400 JN				
Copaene						
Dodecane						
Eicosane	110 JN					
1,4-Ethenecpentalene, 1,2,3,5						
Friedelin						
Heptacosane						1,000 JN
Heptadecane	340 JN					
Hexachloro -benzene						
Hexacosane						590 JN
Hexadecane	300 JN	92 JN			140 JN	
Hexadecanoic acid		320 JN	290 JN	6,600 JN	140 JN	
9-Hexadecenoic acid	250 JN		190 JN			
1,6-Methano-1H-indene, 2,3,3						
4,7-Methano-1H-indene, 4,5,6						
Octadecane						
Octadecanoic acid				2,700 JN		
Octadecanoic acid, 2-methylpropyl		110 JN				
Pentacosane						
Pentadecanoic acid						
Propanoic acid, 2-methyl-, 3						
Sulfur, mol. (S8)						
Tetracosane						
Tetradecanoic acid						
Unresolved Hydrocarbon Complex		140,000 J		87,000 J	140,000 J	240,000 J

N – Analyst has identified compound based on presumptive evidence

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SD6	SD7	SD8	SD9	SW1	SW2
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ70	ENZ71	ENZ72	ENZ73	ENZ74	ENZ75
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/L	µg/L
Volatile TICs						
Unknown (# of detections)	1					1
Ethanol (ACN)		12 JN				
Semi-volatile TICs						
Unknown (# of detections)	4	4	6	6	1	1
Unknown Alkane (# of detections)	6	3	6	5		
Unknown Aromatic (# of detections)	1					
Unknown Halogenated (# of detection						
Unknown Hydrocarbon (# of detection		3	1	2		
Unknown PAH (# of detections)						
Unknown MW=112	8,300 J	4,200 U	1,000 U	1,900 U		
Unknown MW=112	3,000 J	1,500 U	470 U	660 U		
Unknown MW=220						
Unknown MW=426						
Unknown C10.H18.O						
Unknown aromatic C6.H6.CL6						
Unknown aromatic C7.H8.O2						
Unknown aromatic C18.H20						
Unknown aromatic C18.H20						
Unknown PAH MW=252			650 J			
Unknown PAH C15.H24		510 J				
Unknown PAH C15.H24		260 J				
Unknown Sulfur containing						
Benzene, 1,1'-(3,3-dimethyl-						
Benzo[j]fluoranthene						
.beta.-amyrin	2,400 JN					
.beta.-amyrin	2,700 JN					
Butanoic acid, octyl ester				210 JN		
Cholesterol						
Copaene		850 JN				
Dodecane	220 JN					
Eicosane						
1,4-Ethenopentalene, 1,2,3,5						
Friedelin		380 JN				
Heptacosane		680 JN				
Heptadecane						
Hexachloro -benzene						
Hexacosane						
Hexadecane						
Hexadecanoic acid	1,200 JN	660 JN	210 JN	470 JN		
9-Hexadecenoic acid	910 JN	540 JN	150 JN	130 JN		
1,6-Methano-1H-indene, 2,3,3						
4,7-Methano-1H-indene, 4,5,6						
Octadecane						
Octadecanoic acid				100 JN		
Octadecanoic acid, 2-methylpropyl						
Pentacosane				1,400 JN		
Pentadecanoic acid	400 JN	140 JN				
Propanoic acid, 2-methyl-, 3						
Sulfur, mol. (S8)						
Tetracosane						
Tetradecanoic acid						
Unresolved Hydrocarbon Complex	100,000 J					

N – Analyst has identified compound based on presumptive evidence

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SW3	SW4	SW5	SW6	SW7
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ76	ENZ77	ENZ78	ENZ79	ENZ80
Units:	µg/L	µg/L	µg/L	µg/L	µg/L
Volatile TICs					
Unknown (# of detections)		1	1	1	1
Ethanol (ACN)					
Semi-volatile TICs					
Unknown (# of detections)	2	1	1	1	1
Unknown Alkane (# of detections)	5				
Unknown Aromatic (# of detections)					
Unknown Halogenated (# of detection					
Unknown Hydrocarbon (# of detection	4				
Unknown PAH (# of detections)					
Unknown MW=112					
Unknown MW=112					
Unknown MW=220					
Unknown MW=426					
Unknown C10.H18.O					
Unknown aromatic C6.H6.CL6					
Unknown aromatic C7.H8.O2					
Unknown aromatic C18.H20					
Unknown aromatic C18.H20					
Unknown PAH MW=252					
Unknown PAH C15.H24					
Unknown PAH C15.H24					
Unknown Sulfur containing	2 J				
Benzene, 1,1'-(3,3-dimethyl-					
Benzo[j]fluoranthene					
.beta.-amyrin					
.beta.-amyrin					
Butanoic acid, octyl ester					
Cholesterol					
Copaene					
Dodecane					
Eicosane					
1,4-Etheneopentalene, 1,2,3,5					
Friedelin					
Heptacosane					
Heptadecane					
Hexachloro -benzene					
Hexacosane					
Hexadecane					
Hexadecanoic acid	3 JN				
9-Hexadecenoic acid					
1,6-Methano-1H-indene, 2,3,3					
4,7-Methano-1H-indene, 4,5,6					
Octadecane					
Octadecanoic acid					
Octadecanoic acid, 2-methylpropyl					
Pentacosane					
Pentadecanoic acid					
Propanoic acid, 2-methyl-, 3		2 NJ			
Sulfur, mol. (S8)	4 NJ				
Tetracosane					
Tetradecanoic acid	3 JN				
Unresolved Hydrocarbon Complex	1,100 J				

N – Analyst has identified compound based on presumptive evidence

DATA VALIDATION SUMMARY TABLE
EPA CASE #19682

Sample Identification:	SW7D	SW8	SW9	FB1
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ81	ENZ82	ENZ83	ENZ91
Units:	µg/L	µg/L	µg/L	µg/L
Volatile TICs				
Unknown (# of detections)	2	1		
Ethanol (ACN)				
Semi-volatile TICs				
Unknown (# of detections)	1	1	2	1
Unknown Alkane (# of detections)			1	
Unknown Aromatic (# of detections)				
Unknown Halogenated (# of detection				
Unknown Hydrocarbon (# of detection			1	
Unknown PAH (# of detections)				
Unknown MW=112				
Unknown MW=112				
Unknown MW=220				
Unknown MW=426				
Unknown C10.H18.O				
Unknown aromatic C6.H6.CL6				
Unknown aromatic C7.H8.O2				
Unknown aromatic C18.H20				
Unknown aromatic C18.H20				
Unknown PAH MW=252				
Unknown PAH C15.H24				
Unknown PAH C15.H24				
Unknown Sulfur containing				
Benzene, 1,1'-(3,3-dimethyl-				
Benzo[j]fluoranthene				
.beta.-amyrin				
.beta.-amyrin				
Butanoic acid, octyl ester				
Cholesterol				
Copaene				
Dodecane				
Eicosane				
1,4-Etheneopentalene, 1,2,3,5				
Friedelin				
Heptacosane				
Heptadecane				
Hexachloro -benzene				
Hexacosane				
Hexadecane				
Hexadecanoic acid			4 NJ	
9-Hexadecenoic acid				
1,6-Methano-1H-indene, 2,3,3				
4,7-Methano-1H-indene, 4,5,6				
Octadecane				
Octadecanoic acid				
Octadecanoic acid, 2-methylpropyl				
Pentacosane				
Pentadecanoic acid				
Propanoic acid, 2-methyl-, 3				
Sulfur, mol. (S8)				
Tetracosane				
Tetradecanoic acid			2 NJ	
Unresolved Hydrocarbon Complex				

N - Analyst has identified compound based on presumptive evidence

DATA VALIDATION SUMMARY TABLE

EPA CASE #19682

Sample Identification:	SS1	SS2	SS3	SS4	SS5	SS6
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Inorganic Traffic Report Number:	MENY50	MENY51	MENY52	MENY53	MENY54	MENY55
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Inorganics						
Aluminum	6,140	5,640	7,580	6,730	5,300	6,160
Antimony	4.5 UJ	4.7 UJ	4.4 UJ	4.8 UJ	4.6 UJ	4.5 UJ
Arsenic	7.1 J	3.7 J	6.2 J	4.2 J	6.9 J	4.0 J
Barium	41.1 J	13.4 J	53.2	39.2 J	27.7 J	35.8 J
Beryllium	0.36 J	0.22 U	0.47 J	0.23 U	0.22 U	0.21 U
Cadmium	0.33 U	0.35 U	0.33 U	0.35 U	0.41 J	0.33 U
Calcium	56,600 J	816 J	5,800 J	3,820 J	5,440 J	7,990 J
Chromium	13.7	3.8	18.2	17.1	24.2	10.0
Cobalt	4.3 J	1.6 J	4.7 J	3.7 J	3.0 J	5.5 J
Copper	11.7	4.7 J	12.7	12.8	8.5	8.4
Iron	11,700	5,260	13,100	10,600	6,870	12,000
Lead	13.0	15.1	39.7	98.2	26.2	17.0
Magnesium	9,520	418 J	2,790	1,800	1,750	3,380
Manganese	329	36.0	223	173	123	270
Mercury	0.06 UJ	0.07 UJ	0.32	0.07 UJ	0.06 UJ	0.06 UJ
Nickel	11.9	2.6 J	12.7	10.3	6.2 J	8.8 J
Potassium	908 J	213 J	790 J	879 J	455 J	660 J
Selenium	0.68 UJ	0.78 U	0.70 UJ	0.81 U	0.79 U	0.74 U
Silver	1.1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U
Sodium	92.6 U	48.8 U	94.6 U	76.7 U	65.1 U	63.5 U
Thallium	0.33 U	0.38 U	0.34 U	0.39 U	0.38 U	0.36 U
Vanadium	16.9	9.0 J	18.7	17.2	11.0 J	20.7
Zinc	46.8 J	24.9 J	89.0 J	133 J	106 J	61.6 J
Cyanide	0.57 U	0.63 U	0.60 U	0.63 U	0.61 U	0.60 U

DATA VALIDATION SUMMARY TABLE

EPA CASE #19682

Sample Identification:	SS7	SS8	SS9	SS10	SS11	SS12
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Inorganic Traffic Report Number:	MENY56	MENY57	MENY58	MENY59	MENY60	MENY61
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Inorganics						
Aluminum	10,400	7,100	11,200	5,760	5,760	11,300
Antimony	4.3 UJ	4.5 UJ	5.0 UJ	5.6 UJ	4.4 UJ	4.4 UJ
Arsenic	4.9 J	5.2 J	7.3 J	3.8 J	5.2 J	6.1 J
Barium	71.2	51.3	96.7	43.1 J	24.8 J	78.3
Beryllium	0.67 J	0.37 J	0.78 J	0.27 U	0.21 U	0.70 J
Cadmium	0.32 U	0.33 U	0.37 U	0.41 U	0.33 U	0.33 U
Calcium	27,500 J	23,500 J	15,200 J	7,700 J	3,710 J	33,500 J
Chromium	16.2	12.7	21.3	11.8	7.8	18.1
Cobalt	8.1 J	6.3 J	8.1 J	3.9 J	2.6 J	8.1 J
Copper	15.6	11.4	20.7	11.4	6.0	14.7
Iron	16,600	14,300	20,500	13,000	7,390	19,500
Lead	15.1	11.7	41.1	42.9	22.3	24.2
Magnesium	8,120	8,040	6,900	2,850	1,960	9,660
Manganese	305	389	622	260	88.9	311
Mercury	0.06 UJ	0.08 UJ	0.07 UJ	0.08 UJ	0.05 UJ	0.06 UJ
Nickel	19.3	14.9	21.0	9.9 J	7.5 J	18.3
Potassium	1,450	973 J	1,420	958 J	683 J	1,550
Selenium	0.72 UJ	0.67 U	0.77 UJ	0.86 UJ	0.70 UJ	0.70 UJ
Silver	1.0 U	1.1 U	1.4 J	1.4 U	1.1 U	1.1 U
Sodium	120 J	179 J	118 J	205 J	64.5 U	105 J
Thallium	0.35 UJ	0.32 UJ	0.37 U	0.42 U	0.34 U	0.34 UJ
Vanadium	23.3	18.1	27.7	14.8 J	12.4	27.0
Zinc	68.0 J	49.4 J	88.9 J	95.1 J	39.5 J	64.3 J
Cyanide	0.63 U	0.59 U	0.64 U	0.75 U	0.61	0.56 U

DATA VALIDATION SUMMARY TABLE

EPA CASE #19682

Sample Identification:	SS13	SD1	SD2	SD3	SD4	SD5
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Inorganic Traffic Report Number:	MENY62	MENY65	MENY66	MENY67	MENY68	MENY69
Units:	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Inorganics						
Aluminum	8,730	3,260	2,620	7,360	3,850	7,740
Antimony	4.5 UJ	4.5 UJ	5.3 UJ	8.7 UJ	4.3 UJ	5.0 UJ
Arsenic	5.6 J	3.0 J	3.0 J	10.1 J	4.9 J	7.1 J
Barium	52.5	30.2 J	25.5 J	71.2 J	49.5	71.3
Beryllium	0.60 J	0.22 U	0.25 U	0.41 U	0.55 J	0.76 J
Cadmium	0.33 U	0.33 U	0.39 U	1.3 J	0.32 U	0.37 U
Calcium	21,600 J	22,400 J	18,400 J	34,700 J	58,000 J	20,400 J
Chromium	12.8	10.3	9.6	32.1	27.0	16.9
Cobalt	6.8 J	3.0 J	2.6 J	5.8 J	4.0 J	6.3 J
Copper	12.3	12.9	18.8	63.2	19.9	27.8
Iron	15,000	7,110	6,150	17,600	33,800	17,800
Lead	18.5	23.6	33.3	209	70.2	81.0
Magnesium	7,410	6,650	5,520	10,200	9,370	5,570
Manganese	392	280	146	395	743	644
Mercury	0.06 UJ	0.12 J	0.11 J	0.38	0.06 UJ	0.14
Nickel	15.7	7.5 J	7.5 J	20.4	12.7	17.1
Potassium	1,430	485 J	395 J	1,170 J	382 J	1,290 J
Selenium	0.78 U	0.75 UJ	0.87 U	1.5 U	0.76 UJ	0.84 U
Silver	1.1 U	1.1 U	1.3 U	2.1 U	1.1 U	1.2 U
Sodium	118 J	177 J	140 J	1,920 J	246 J	269 J
Thallium	0.38 U	0.36 U	0.42 U	0.71 U	0.37 U	0.41 U
Vanadium	22.2	9.1 J	7.2 J	22.2 J	15.1	19.5
Zinc	57.3 J	74.0 J	75.0 J	412 J	142 J	207 J
Cyanide	0.61 U	0.61 U	0.96	1.4	0.62 U	0.96

DATA VALIDATION SUMMARY TABLE

EPA CASE #19682

Sample Identification:	SD6	SD7	SD8	SD9	SW1	SW2
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Inorganic Traffic Report Number:	MENY70	MENY71	MENY72	MENY73	MENY74	MENY75
Units:	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L
Inorganics						
Aluminum	4,700	4,320	5,730	5,310	47.2 U	36.7 U
Antimony	8.9 UJ	5.5 UJ	5.0 UJ	5.3 UJ	18.4 U	18.4 U
Arsenic	11.4 J	7.1 J	8.1 J	2.3 J	4.2 J	2.6 U
Barium	263	99.1	77.6 J	50.3 J	48.0 J	46.0 J
Beryllium	0.42 U	0.26 U	0.27 J	0.25 U	0.87 J	0.50 U
Cadmium	0.66 U	0.40 U	0.37 U	0.39 U	1.6 U	1.6 U
Calcium	123,000 J	70,900 J	29,900	2,920	75,900	74,800
Chromium	13.9	10.5	25.5	10.8	2.7 U	2.7 U
Cobalt	7.4 J	5.4 J	5.6 J	2.7 J	2.5 U	2.5 U
Copper	65.0	25.7	24.6	7.6	8.0 U	5.5 U
Iron	68,600	29,100	16,700	5,100	105 U	85.7 U
Lead	161	32.0	85.3	19.1	1.2 J	2.0 J
Magnesium	6,710	5,720	9,270 J	930 J	16,600	16,400
Manganese	1,850	584	787	63.8	72.7	69.2
Mercury	0.17 J	0.08 J	0.10 J	0.07 U	0.10 J	0.10 U
Nickel	30.1	16.0	16.2	5.9 J	3.0 U	3.0 U
Potassium	1,100 J	911 J	909 J	352 J	3,610 J	3,440 J
Selenium	1.5 UJ	0.93 UJ	5.1 UJ	0.98 UJ	3.1 U	3.1 U
Silver	2.2 U	1.3 U	1.2 U	1.3 U	3.9 U	3.9 U
Sodium	456 J	232 J	229 U	99.0 U	63,900	63,400
Thallium	0.71 U	0.45 U	0.55 UR	0.53 UR	2.6 UJ	2.6 UJ
Vanadium	15.5 J	13.8 J	19.7	12.6 J	3.3 U	2.5 U
Zinc	598 J	172 J	152	44.4	13.7 U	7.9 U
Cyanide	1.3	0.75 U	0.73 U	0.69 U	10.0 U	10.0 U

DATA VALIDATION SUMMARY TABLE

EPA CASE #19682

Sample Identification:	SW3	SW4	SW5	SW6	SW7	SW7D
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Inorganic Traffic Report Number:	MENY76	MENY77	MENY78	MENY79	MENY80	MENY81
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Inorganics						
Aluminum	31.0 U	34.6 U	53.8 U	45.8 U	29.7 U	27.0 U
Antimony	18.4 U	18.4 U	18.4 U	18.4 U	18.4 U	18.4 U
Arsenic	2.8 J	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Barium	87.4 J	87.8 J	83.3 J	64.0 J	67.7 J	65.8 J
Beryllium	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Cadmium	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Calcium	167,000	175,000	208,000	265,000	269,000	267,000
Chromium	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Copper	5.5 U	5.1 U	6.6 U	8.0 U	8.8 U	5.9 U
Iron	50.6 U	67.1 U	48.0 U	18.1 U	338	303
Lead	2.5 J	2.6 J	2.4 J	1.9 J	1.2 UJ	1.4 J
Magnesium	43,000	44,600	55,900	79,100	85,000	83,500
Manganese	578	448	399	336	482	435
Mercury	0.13 J	0.10 J	0.10 U	0.10 U	0.10 U	0.10 J
Nickel	3.0 U	3.0 U	5.2 J	14.0 J	14.5 J	14.5 J
Potassium	11,000	11,500	16,800	27,500	28,900	28,600
Selenium	3.1 U	3.1 UJ	3.1 U	3.1 U	3.1 U	3.1 U
Silver	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U
Sodium	267,000	231,000	195,000	105,000	91,200	89,200
Thallium	2.6 UJ	2.6 U	2.6 UJ	2.6 UJ	2.6 UJ	2.6 UJ
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	16.5 U	41.6	65.1	125	89.1	107
Cyanide	13.2	11.8	10.0	10.0 U	10.0 U	10.0 U

DATA VALIDATION SUMMARY TABLE

EPA CASE #19682

Sample Identification:	SW8	SW9	FB1
Date Sampled:	3/31/93	3/31/93	3/31/93
Inorganic Traffic Report Number:	MENY82	MENY83	MENY91
Units:	µg/L	µg/L	µg/L
Inorganics			
Aluminum	34.0 U	54.0 U	30.5 U
Antimony	18.4 U	18.4 U	18.4 U
Arsenic	2.6 U	2.6 U	2.6 U
Barium	108 J	24.8 J	1.0 U
Beryllium	0.50 U	0.50 U	0.50 U
Cadmium	1.6 U	1.6 U	1.6 U
Calcium	202,000	21,000	322 J
Chromium	2.7 U	2.7 U	2.7 U
Cobalt	2.5 U	2.5 U	2.5 U
Copper	8.7 U	4.1 U	2.9 U
Iron	16.2 U	532	9.9 U
Lead	2.0 J	4.5 J	2.8 J
Magnesium	81,200	4,550 J	85.9 J
Manganese	31.4	165	1.0 U
Mercury	0.10 U	0.10 U	0.10 U
Nickel	3.0 U	3.0 U	3.0 U
Potassium	28,400	4,830 J	147 J
Selenium	3.1 U	3.1 UJ	3.1 U
Silver	3.9 U	3.9 U	3.9 U
Sodium	146,000	7,960	1,880 J
Thallium	2.6 UJ	2.6 UJ	2.6 U
Vanadium	2.5 U	2.5 U	2.5 U
Zinc	10.6 U	10.6 U	6.2 U
Cyanide	12.9	10.0 U	10.0 U

Sample Quantitation Limits

The Sample Quantitation Limit table which follows is provided for use in HRS scoring procedures. Sample quantitation limits (SQLs) are required when particular compounds or analytes are not detected in background samples, but are detected in site samples. For case #19682, samples SS1, SS2, SD1, and SW1 were the background samples.

Because of the uniformity of detection limits for organic compounds, sample quantitation limits for all organic compounds are provided in this table. The Validation Summary table should be consulted before the Sample Quantitation Limit table for the SQLs of organic compounds, because compound-specific detection limits may be raised for a particular sample. SQLs for inorganic compounds are provided only as required above. Qualification of data as estimated or unusable is not provided in the Sample Quantitation Limit table, and this information must be extracted from the text of the report or the Validation Summary Table.

SAMPLE QUANTITATION LIMITS
EPA CASE #19682

Sample Identification:	SS1	SS2	SS3	SS4	SS5	SS6
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ50	ENZ51	ENZ52	ENZ53	ENZ54	ENZ55
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatiles	13 U	14 U	13 U	13 U	14 U	12 U
Semi-volatiles – 1	430 U	450 U	420 U	430 U	440 U	390 U
Semi-volatiles – 2	1,000 U	1,100 U	1,000 U	1,000 U	1,100 U	950 U
Pesticides – 1	2.2 U	2.3 U	22 U	22 U	23 U	2.0 U
Pesticides – 2	4.3 U	4.5 U	42 U	43 U	45 U	3.9 U
Methoxychlor	22 U	23 U	220 U	220 U	230 U	20 U
Toxaphene	220 U	230 U	2,200 U	2,200 U	2,300 U	200 U
Arocior 1221	88 U	92 U	850 U	870 U	910 U	80 U
Other Aroclors	43 U	45 U	420 U	430 U	450 U	39 U
	MENY50 mg/kg	MENY51 mg/kg	MENY52 mg/kg	MENY53 mg/kg	MENY54 mg/kg	MENY55 mg/kg
Aluminum	—	—	—	—	—	—
Antimony	4.5 U	4.7 U	4.4 U	4.8 U	4.6 U	4.5 U
Beryllium	—	0.22 U	0.21 U	0.23 U	0.22 U	0.21 U
Cadmium	0.33 U	0.35 U	0.33 U	0.35 U	0.34 U	0.33 U
Chromium	—	—	—	—	—	—
Cobalt	—	—	—	—	—	—
Copper	—	—	—	—	—	—
Iron	—	—	—	—	—	—
Mercury	0.06 U	0.07 U	0.05 U	0.07 U	0.06 U	0.06 U
Nickel	—	—	—	—	—	—
Selenium	0.68 U	0.78 U	0.70 U	0.81 U	0.79 U	0.74 U
Silver	1.1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U
Sodium	9.1 U	9.6 U	9.0 U	9.7 U	9.4 U	9.1 U
Thallium	0.33 U	0.38 U	0.34 U	0.39 U	0.38 U	0.36 U
Vanadium	—	—	—	—	—	—
Zinc	—	—	—	—	—	—
Cyanide	0.57 U	0.63 U	0.60 U	0.63 U	0.61 U	0.60 U

Semi-volatiles – 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles – 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides – 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides – 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

SAMPLE QUANTITATION LIMITS
EPA CASE #19682

Sample Identification:	SS7	SS8	SS9	SS10	SS11	SS12
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ56	ENZ57	ENZ58	ENZ59	ENZ60	ENZ61
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatiles	12 U	12 U	13 U	15 U	11 U	12 U
Semi-volatiles - 1	400 U	400 U	440 U	510 U	380 U	390 U
Semi-volatiles - 2	980 U	980 U	1,100 U	1,200 U	910 U	940 U
Pesticides - 1	21 U	2.0 U	23 U	2.6 U	1.9 U	2.0 U
Pesticides - 2	40 U	4.0 U	44 U	5.1 U	3.8 U	3.9 U
Methoxychlor	210 U	20 U	230 U	26 U	19 U	20 U
Toxaphene	2,100 U	200 U	2,300 U	260 U	190 U	200 U
Aroclor 1221	820 U	81 U	890 U	100 U	76 U	79 U
Other Aroclors	400 U	40 U	440 U	51 U	38 U	39 U
	MENY56	MENY57	MENY58	MENY59	MENY60	MENY61
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	—	—	—	—	—	—
Antimony	4.3 U	4.5 U	5.0 U	5.6 U	4.4 U	4.4 U
Beryllium	0.20 U	0.21 U	0.24 U	0.27 U	0.21 U	0.21 U
Cadmium	0.32 U	0.33 U	0.37 U	0.41 U	0.33 U	0.33 U
Chromium	—	—	—	—	—	—
Cobalt	—	—	—	—	—	—
Copper	—	—	—	—	—	—
Iron	—	—	—	—	—	—
Mercury	0.06 U	0.06 U	0.07 U	0.08 U	0.05 U	0.05 U
Nickel	—	—	—	—	—	—
Selenium	0.72 U	0.67 U	0.77 U	0.86 U	0.70 U	0.70 U
Silver	1.0 U	1.1 U	1.2 U	1.4 U	1.1 U	1.1 U
Sodium	8.8 U	9.2 U	10.2 U	11.4 U	9.0 U	9.0 U
Thallium	0.35 U	0.32 U	0.37 U	0.42 U	0.34 U	0.34 U
Vanadium	—	—	—	—	—	—
Zinc	—	—	—	—	—	—
Cyanide	0.63 U	0.59 U	0.64 U	0.75 U	0.57 U	0.56 U

Semi-volatiles - 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles - 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides - 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides - 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

SAMPLE QUANTITATION LIMITS
EPA CASE #19682

Sample Identification:	SS13	SD1	SD2	SD3	SD4	SD5
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ62	ENZ65	ENZ66	ENZ67	ENZ68	ENZ69
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Volatiles	13 U	14 U	13 U	23 U	12 U	14 U
Semi-volatiles - 1	430 U	440 U	430 U	770 U	400 U	450 U
Semi-volatiles - 2	1,000 U	1,100 U	1,000 U	1,900 U	980 U	1,100 U
Pesticides - 1	2.2 U	2.3 U	2.2 U	4.0 U	2.1 U	2.3 U
Pesticides - 2	4.3 U	4.5 U	4.3 U	7.7 U	4.0 U	4.5 U
Methoxychlor	22 U	23 U	22 U	40 U	21 U	23 U
Toxaphene	220 U	230 U	220 U	400 U	210 U	230 U
Aroclor 1221	88 U	91 U	88 U	160 U	82 U	92 U
Other Aroclors	43 U	45 U	43 U	77 U	40 U	45 U
	MENY62 mg/kg	MENY65 mg/kg	MENY66 mg/kg	MENY67 mg/kg	MENY68 mg/kg	MENY69 mg/kg
Aluminum	—	—	—	—	—	—
Antimony	4.5 U	4.5 U	5.3 U	8.7 U	4.3 U	5.0 U
Beryllium	0.21 U	0.22 U	0.25 U	0.41 U	0.21 U	0.24 U
Cadmium	0.33 U	0.33 U	0.39 U	0.64 U	0.32 U	0.37 U
Chromium	—	—	—	—	—	—
Cobalt	—	—	—	—	—	—
Copper	—	—	—	—	—	—
Iron	—	—	—	—	—	—
Mercury	0.06 U	—	—	—	—	—
Nickel	—	—	—	—	—	—
Selenium	0.78 U	0.75 U	0.87 U	1.5 U	0.76 U	0.84 U
Silver	1.1 U	1.1 U	1.3 U	2.1 U	1.1 U	1.2 U
Sodium	9.2 U	—	—	—	—	—
Thallium	0.38 U	0.36 U	0.42 U	0.71 U	0.37 U	0.41 U
Vanadium	—	—	—	—	—	—
Zinc	—	—	—	—	—	—
Cyanide	0.61 U	0.61 U	0.66 U	1.2 U	0.62 U	0.72 U

Semi-volatiles - 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles - 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides - 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides - 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

SAMPLE QUANTITATION LIMITS
EPA CASE #19682

Sample Identification:	SD6	SD7	SD8	SD9	SW1	SW2
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ70	ENZ71	ENZ72	ENZ73	ENZ74	ENZ75
Units:	µg/kg	µg/kg	µg/kg	µg/kg	µg/L	µg/L
Volatiles	21 U	18 U	15 U	14 U	10 U	10 U
Semi-volatiles - 1	700 U	590 U	480 U	460 U	10 U	10 U
Semi-volatiles - 2	1,700 U	1,400 U	1,200 U	1,100 U	25 U	25 U
Pesticides - 1	3.6 U	3.0 U	2.5 U	2.4 U	0.050 U	0.050 U
Pesticides - 2	7.0 U	5.9 U	4.9 U	4.8 U	0.10 U	0.10 U
Methoxychlor	36 U	30 U	25 U	24 U	0.50 U	0.50 U
Toxaphene	360 U	300 U	250 U	240 U	5.0 U	5.0 U
Aroclor 1221	140 U	120 U	99 U	94 U	2.0 U	2.0 U
Other Aroclors	70 U	59 U	49 U	48 U	1.0 U	1.0 U
	MENY70	MENY71	MENY72	MENY73	MENY74	MENY75
	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	µg/L
Aluminum	—	—	—	—	27.0 U	27.0 U
Antimony	8.9 U	5.5 U	5.0 U	5.3 U	18.4 U	18.4 U
Beryllium	0.42 U	0.26 U	0.24 U	0.25 U	—	—
Cadmium	0.66 U	0.40 U	0.37 U	0.39 U	1.6 U	1.6 U
Chromium	—	—	—	—	2.7 U	2.7 U
Cobalt	—	—	—	—	2.5 U	2.5 U
Copper	—	—	—	—	2.9 U	2.9 U
Iron	—	—	—	—	6.5 U	6.5 U
Mercury	—	—	—	—	—	—
Nickel	—	—	—	—	3.0 U	3.0 U
Selenium	1.5 U	0.93 U	5.1 U	0.98 U	3.1 U	3.1 U
Silver	2.2 U	1.3 U	1.2 U	1.3 U	3.9 U	3.9 U
Sodium	—	—	—	—	—	—
Thallium	0.71 U	0.45 U	0.55 U	0.53 U	2.6 U	2.6 U
Vanadium	—	—	—	—	2.5 U	2.5 U
Zinc	—	—	—	—	4.7 U	4.7 U
Cyanide	1.1 U	0.75 U	0.73 U	0.69 U	10.0 U	10.0 U

Semi-volatiles - 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles - 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides - 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides - 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

SAMPLE QUANTITATION LIMITS
EPA CASE #19682

Sample Identification:	SW3	SW4	SW5	SW6	SW7	SW7D
Date Sampled:	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ76	ENZ77	ENZ78	ENZ79	ENZ80	ENZ81
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Volatiles	10 U	10 U	10 U	10 U	10 U	10 U
Semi-volatiles - 1	10 U	10 U	10 U	10 U	10 U	10 U
Semi-volatiles - 2	25 U	25 U	25 U	25 U	25 U	25 U
Pesticides - 1	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Pesticides - 2	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Aroclor 1221	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Other Aroclors	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	MENY76	MENY77	MENY78	MENY79	MENY80	MENY81
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aluminum	27.0 U	27.0 U	27.0 U	27.0 U	27.0 U	27.0 U
Antimony	18.4 U	18.4 U	18.4 U	18.4 U	18.4 U	18.4 U
Beryllium	—	—	—	—	—	—
Cadmium	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U
Chromium	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Cobalt	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Copper	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U	2.9 U
Iron	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U
Mercury	—	—	—	—	—	—
Nickel	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
Selenium	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Silver	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U	3.9 U
Sodium	—	—	—	—	—	—
Thallium	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U	2.6 U
Vanadium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Zinc	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U	4.7 U
Cyanide	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U

Semi-volatiles - 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles - 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides - 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides - 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

SAMPLE QUANTITATION LIMITS
EPA CASE #19682

Sample Identification:	SW8	SW9	FB1
Date Sampled:	3/31/93	3/31/93	3/31/93
Organic Traffic Report Number:	ENZ82	ENZ83	ENZ91
Units:	µg/L	µg/L	µg/L
Volatiles	10 U	10 U	10 U
Semi-volatiles - 1	10 U	10 U	10 U
Semi-volatiles - 2	25 U	25 U	25 U
Pesticides - 1	0.050 U	0.050 U	0.050 U
Pesticides - 2	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U
Toxaphene	5.0 U	5.0 U	5.0 U
Aroclor 1221	2.0 U	2.0 U	2.0 U
Other Aroclors	1.0 U	1.0 U	1.0 U
	MENY82 µg/L	MENY83 µg/L	MENY91 µg/L
Aluminum	27.0 U	27.0 U	27.0 U
Antimony	18.4 U	18.4 U	18.4 U
Beryllium	—	—	—
Cadmium	1.6 U	1.6 U	1.6 U
Chromium	2.7 U	2.7 U	2.7 U
Cobalt	2.5 U	2.5 U	2.5 U
Copper	2.9 U	2.9 U	2.9 U
Iron	6.5 U	6.5 U	6.5 U
Mercury	—	—	—
Nickel	3.0 U	3.0 U	3.0 U
Selenium	3.1 U	3.1 U	3.1 U
Silver	3.9 U	3.9 U	3.9 U
Sodium	—	—	—
Thallium	2.6 U	2.6 U	2.6 U
Vanadium	2.5 U	2.5 U	2.5 U
Zinc	4.7 U	4.7 U	4.7 U
Cyanide	10.0 U	10.0 U	10.0 U

Semi-volatiles - 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles - 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides - 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides - 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

eder associates
consulting engineers, p. c.

OFFICES:
Locust Valley, NY
Madison, WI
Ann Arbor, MI
Augusta, GA
Jacksonville, FL
Trenton, NJ

August 25, 1993
File #720-27

George Carpenter
Environmental Quality Analyst
Superfund Section
Environmental Response Division
Michigan Department of Natural Resources
Knapp's Office Centre
Lansing, Michigan 48909

Re: EPA Case #19918 Data Validation Report

Dear Mr. Carpenter:

Enclosed is one copy of our Data Validation Report for EPA Case #19918 for your review.

Please call if you have any questions or concerns.

Very truly yours,

EDER ASSOCIATES CONSULTING ENGINEERS, P.C.

KVlahogiani

Konstadina Vlahogiani
Project Manager

KV/cw

L082593b.GC

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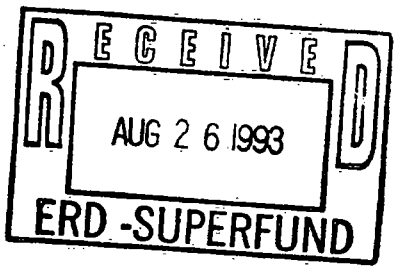
MICHIGAN DEPARTMENT OF

NATURAL RESOURCES



DATA VALIDATION REPORT

EPA CASE #19918

MICHIGAN DEPARTMENT OF

NATURAL RESOURCES

SAMPLED MAY 5-6, 1993

AUGUST 1993

FILE #720-27

EDER ASSOCIATES CONSULTING ENGINEERS, P.C.

Ann Arbor, Michigan

Locust Valley, New York

Madison, Wisconsin

Augusta, Georgia

Trenton, New Jersey

Jacksonville, Florida

INTRODUCTION

This report summarizes the data validation efforts of Eder Associates Consulting Engineers, P.C. (Eder) for water samples collected by the Michigan Department of Natural Resources (MDNR) on May 5-6, 1993, for EPA Case #19918. Eight water samples were submitted for Contract Laboratory Program (CLP) Routine Analytical Services (RAS) for both the Target Compound List (TCL) and the Target Analyte List (TAL) parameters. RAS organic services were provided by Environmental Control Technology Corporation (Encotec) and RAS inorganic services were provided by Skinner and Sherman Laboratories, Inc. Eder personnel validated all results. The samples included in this case are:

WATERS

Sample Number	Organic Traffic Report Number	Inorganic Traffic Report Number
MW1	ETW01	METL01
MW2	ETW02	METL02
FB	ETW03	METL03
MW3	ETW04	METL04
MW4	ETW05	METL05
MW4D	ETW06	METL06
MW6	ETW08	METL08
PB1	ETW11	METL11

Data validation was conducted according to guidelines found in the USEPA guidance documents National Functional Guidelines for Organic Data Review (Draft), December, 1990 (Revised June, 1991) and Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, July 1, 1988.

DATA VALIDATION SUMMARY

Organics

Eight water samples (MW1 through MW4, MW4D, MW6, FB, and PB1) were analyzed by Environmental Control Technology Corporation (Encotec) for the RAS TCL organic parameter list. The data is acceptable for use as qualified below.

Volatiles (RAS Waters)

- The laboratory sample log-in sheet noted that the vials of samples MW1, MW2, MW3, and MW6 contained air bubbles. The case narrative did not state this problem. All non-detections in these samples were qualified as having estimated detection limits (UJ).

- Low levels of methylene chloride were detected in the laboratory blank and methylene chloride, acetone, and 2-butanone were detected in the field and pump blanks. These compounds are common laboratory contaminants. Therefore, all detections of these compounds in the samples were qualified as non-detect (U) if their concentration was less than or equal to 10 times the concentration in the highest associated blank.

- The laboratory did not qualify methylene chloride detections in the samples with a "B" qualifier.

- No trip blanks were submitted.

Semi-volatiles (RAS Waters)

- The percent relative standard deviations of two compounds were above the control limit in the initial calibration. These compounds were not detected in any of the samples, therefore, no qualification of the data is required.

- The percent differences between initial and continuing calibration relative response factors of several compounds were above the control limit in the continuing calibration. None of these compounds were detected in any of the samples, therefore, no qualification of the data is required.

- One method blank and the pump blank contained low levels of di-n-butylphthalate and bis(2-ethylhexyl)phthalate. These compounds are common laboratory contaminants. Therefore, all detections of these compounds in the samples were qualified as non-detect (U) if their concentration was less than or equal to 10 times the concentration in the highest associated blank.

- The laboratory did not qualify di-n-butylphthalate and bis(2-ethylhexyl)phthalate detections in associated samples with a "B" qualifier.

- Two internal standard areas were below the lower control limits for the original analyses and the reanalyses of samples MW2 and MW4. The original analyses results for both samples were used in the validation summary table. All non-detections associated with the out of compliance internal standards were qualified as having estimated detection limits (UJ). The affected compounds for these samples are: pyrene; butylbenzylphthalate; 3,3'-dichlorobenzidine; benzo(a)anthracene; bis(2-ethylhexyl)phthalate; chrysene; di-n-octylphthalate; benzo(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; indeno(1,2,3-cd)pyrene; dibenzo(a,h)anthracene; and benzo(g,h,i)perylene.

- The laboratory received insufficient sample volume for sample MW1. The sample was extracted for semivolatile analysis using a sample volume of 0.5L. Detection limits were maintained by adjusting the final extract volume.

Pesticides (RAS Waters)

- One surrogate recovery was below the lower advisory limit on both analytical columns for all samples. Therefore, all non-detections in the samples were qualified as having estimated detection limits (UJ).

- The laboratory received insufficient sample volume for sample MW1. The sample was extracted for pesticides analysis using a sample volume of 0.5L. Detection limits were maintained by adjusting the final extract volume.

Inorganics (RAS Waters)

Eight water samples (MW1 through MW4, MW4D, MW6, FB, and PB1) were analyzed by Skinner and Sherman Laboratories, Inc. for the RAS TAL inorganic parameter list. The data is acceptable for use as qualified below.

- The correlation coefficient for the calibration curve of selenium analyses was below 0.995. Therefore, all detections of this analyte in the samples were qualified as estimated (J) and all non-detections were qualified as having estimated detection limits (UJ).

- The selenium CRDL standard percent recovery was significantly high. All selenium results in the samples were already qualified as estimated. No further qualification of the data is required.

- Lead and sodium were detected in the preparation blank. Therefore, all samples with concentrations less than five times the level in the blank were qualified as non-detect (U) at the associated reporting level.

- Aluminum, beryllium, copper, iron, sodium, and zinc were detected in various laboratory blanks. Therefore, all samples with concentrations less than five times the level in the highest associated blank were qualified as non-detect (U) at the associated reporting level.

- Aluminum, copper, silver, and zinc demonstrated a negative drift in the preparation blank. Therefore, all non-detections of these analytes in the samples were qualified as having estimated detection limits (UJ).

- The ICP Interference Check Sample (ICS) analysis gave results above the IDL for sodium which was not present in the ICS solution. The concentrations of sodium in the samples were found to be significantly higher than their respective concentrations in the ICS, therefore, no qualification of the data is required.

- The matrix spike recovery for thallium was below the lower control limit. Therefore, all non-detections of this analyte in the samples were qualified as having estimated detection limits (UJ).

- Lead results for samples MW4D and FB were qualified as estimated due to furnace Quality Control (Q.C.), which was not within control limits.

- The method of standard additions correlation coefficient was below 0.995 for

selenium analysis of sample MW2. Selenium results in all samples were already qualified as estimated. No further qualification of the data is required.

- The furnace Q.C. was not within control limits for selenium analyses for samples MW1, MW6, and FB. All selenium results in the samples were already qualified as estimated. No further qualification of the data is required.

- The furnace Q.C. was not within control limits for thallium analyses for samples MW1, MW2, MW3, MW4, MW4D, and MW6. All thallium results in the samples were already qualified as estimated. No further qualification of the data is required.

- Sample MW6 was diluted by a factor of five before thallium analysis. The laboratory reported thallium results for this sample without taking into account this dilution. The corrected thallium results for sample MW6 were added in the validation summary table.

- All compounds detected between the instrument detection limit and the contract required detection limit, not already qualified as non-detect due to blank contamination, were qualified as estimated (J).

DATA VALIDATION SUMMARY TABLE
EPA CASE #19918

Sample Identification:	MW1	MW2	FB	MW3	MW4	MW4D
Date Sampled:	5/6/93	5/5/93	5/5/93	5/5/93	5/5/93	5/6/93
Organic Traffic Report Number:	ETW01	ETW02	ETW03	ETW04	ETW05	ETW06
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Volatile Organics						
Methylene Chloride	10 UJ	10 UJ	3 J	10 UJ	10 U	10 U
Acetone	10 UJ	UJ	5 J	10 UJ	10 U	10 U
2-Butanone	10 UJ	10 UJ	2 J	10 UJ	10 U	10 U
Semi-volatile Organics						
Di-n-butylphthalate	10 U			NA	10 U	10 U
bis(2-ethylhexyl)phthalate	10 U	10 UJ		NA	10 UJ	10 U
Pesticides/PCBs						
All compounds	UJ	UJ	UJ	NA	UJ	UJ

NA – Analysis not conducted for this parameter

DATA VALIDATION SUMMARY TABLE
EPA CASE #19918

Sample Identification:	MW6	PB1
Date Sampled:	5/5/93	5/5/93
Organic Traffic Report Number:	ETW08	ETW11
Units:	µg/L	µg/L
Volatile Organics		
Methylene Chloride	10 UJ	2 J
Acetone	10 UJ	4 J
2-Butanone	UJ	2 J
Semi-volatile Organics		
Di-n-butylphthalate	10 U	1 J
bis(2-ethylhexyl)phthalate	10 U	1 J
Pesticides/PCBs		
All compounds	UJ	UJ

NA – Analysis not conducted for this parameter

DATA VALIDATION SUMMARY TABLE
EPA CASE #19918

Sample Identification:	MW1	MW2	FB	MW3	MW4	MW4D
Date Sampled:	5/6/93	5/5/93	5/5/93	5/5/93	5/5/93	5/6/93
Organic Traffic Report Number:	ETW01	ETW02	ETW03	ETW04	ETW05	ETW06
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Volatile TICs						
Unknown (# of detections)						
Semi-volatile TICs						
Unknown (# of detections)	13	10		NA	9	3
Unknown Alkane		3 J		NA		
Unknown Organic Acid				NA	3 J	
2-(Butoxyethoxy)ethanol		2 JN		NA		
Benzene, 1,1'-Sulfonylbis[4-chloro-				NA		
Sulfur		62 JN		NA	34 JN	12 JN

NA – Analysis not conducted for this parameter

N – Analyst has identified compound based on presumptive evidence

DATA VALIDATION SUMMARY TABLE
EPA CASE #19918

Sample Identification:	MW8	PB1
Date Sampled:	5/5/93	5/5/93
Organic Traffic Report Number:	ETW08	ETW11
Units:	µg/L	µg/L
Volatile TICs		
Unknown (# of detections)		
Semi-volatile TICs		
Unknown (# of detections)	1	1
Unknown Alkane		
Unknown Organic Acid		
2-(Butoxyethoxy)ethanol		
Benzene, 1,1'-Sulfonylbis[4-chloro-		2 JN
Sulfur	20 JN	

NA – Analysis not conducted for this parameter

N – Analyst has identified compound based on presumptive evidence

DATA VALIDATION SUMMARY TABLE
EPA CASE #19918

Sample Identification:	MW1	MW2	FB	MW3	MW4	MW4D
Date Sampled:	5/6/93	5/5/93	5/5/93	5/5/93	5/5/93	5/6/93
Inorganic Traffic Report Number:	METL01	METL02	METL03	METL04	METL05	METL06
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Inorganics						
Aluminum	39.0 U	24.0 U	29.0 U	46.7 U	27.4 U	30.6 U
Antimony	25.5 J	18.6 U	18.6 U	18.6 U	18.6 U	18.6 U
Arsenic	2.7 J	11.4	2.3 U	6.8 J	5.0 J	5.7 J
Barium	27.9 J	382	1.1 U	351	357	242
Beryllium	0.46 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Calcium	86,700	194,000	291 J	165,000	195,000	174,000
Chromium	3.3 U	3.3 U	3.3 U	3.9 J	3.3 U	3.3 U
Cobalt	4.2 J	4.9 J	2.9 U	2.9 U	2.9 U	2.9 U
Copper	5.6 U	2.9 U	2.7 UJ	3.2 U	2.7 UJ	2.7 UJ
Iron	36.2 U	8,880	56.4 J	60.8 J	10,500	20,100
Lead	3.0 U	5.5	3.8 UJ	4.0 U	3.5 U	2.9 UJ
Magnesium	25,400	91,400	93.4 J	90,800	95,000	105,000
Manganese	757	3,610	1.9 J	2,030	819	2,760
Mercury	0.10 J	0.10 J	0.10 U	0.10 J	0.10 U	0.10 U
Nickel	4.2 U	5.9 J	4.2 U	4.2 U	23.5 J	9.3 J
Potassium	6,770	55,100	141 J	66,200	48,900	53,700
Selenium	3.7 J	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ
Silver	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ	3.3 UJ
Sodium	13,600	187,000	1,910 J	248,000	75,400	82,100
Thallium	2.7 UJ	2.7 UJ	2.7 UJ	13.5 UJ	2.7 UJ	2.7 UJ
Vanadium	2.1 J	2.1 U	2.1 U	4.2 J	2.1 U	2.1 U
Zinc	17.1 U	38.4	4.8 UJ	4.8 UJ	216	1,590
Cyanide	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U

DATA VALIDATION SUMMARY TABLE
EPA CASE #19918

Sample Identification:	MW6	PB1
Date Sampled:	5/5/93	5/5/93
Inorganic Traffic Report Number:	METL08	METL11
Units:	µg/L	µg/L
Inorganics		
Aluminum	22.3 U	76.3 U
Antimony	18.6 U	18.6 U
Arsenic	2.3 U	2.3 U
Barium	657	1.2 J
Beryllium	0.30 U	0.30 U
Cadmium	1.4 U	1.4 U
Calcium	190,000	211 J
Chromium	3.3 U	3.3 U
Cobalt	2.9 U	2.9 U
Copper	2.7 UJ	2.7 UJ
Iron	22,200	81.0 J
Lead	2.3 U	2.9 U
Magnesium	38,100	68.2 J
Manganese	285	1.3 J
Mercury	0.10 U	0.10 J
Nickel	4.2 U	4.2 U
Potassium	14,000	96.0 J
Selenium	3.3 UJ	3.3 UJ
Silver	3.3 UJ	3.3 UJ
Sodium	231,000	1,690 J
Thallium	13.5 UJ	2.7 UJ
Vanadium	2.1 U	2.1 U
Zinc	192	4.8 UJ
Cyanide	10.0 U	10.0 U

Sample Quantitation Limits

The Sample Quantitation Limit table which follows is provided for use in HRS scoring procedures. Sample quantitation limits (SQLs) are required when particular compounds or analytes are not detected in background samples, but are detected in site samples. For case #19918, sample MW1 was the background sample.

Because of the uniformity of detection limits for organic compounds, sample quantitation limits for all organic compounds are provided in this table. The Validation Summary table should be consulted before the Sample Quantitation Limit table for the SQLs of organic compounds, because compound-specific detection limits may be raised for a particular sample. SQLs for inorganic compounds are provided only as required above. Qualification of data as estimated or unusable is not provided in the Sample Quantitation Limit table, and this information must be extracted from the text of the report or the Validation Summary Table.

SAMPLE QUANTITATION LIMITS
EPA CASE #19918

Sample Identification:	MW1	MW2	FB	MW3	MW4	MW4D
Date Sampled:	5/6/93	5/5/93	5/5/93	5/5/93	5/5/93	5/6/93
Organic Traffic Report Number:	ETW01	ETW02	ETW03	ETW04	ETW05	ETW06
Units:	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Volatiles	10 U	10 U	10 U	10 U	10 U	10 U
Semi-volatiles - 1	10 U	10 U	10 U	10 U	10 U	10 U
Semi-volatiles - 2	25 U	25 U	25 U	25 U	25 U	25 U
Pesticides - 1	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Pesticides - 2	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toxaphene	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Arocior 1221	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Other Aroclors	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	METL01	METL02	METL03	METL04	METL05	METL06
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aluminum	19.2 U	19.2 U	19.2 U	19.2 U	19.2 U	19.2 U
Beryllium	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Cadmium	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
Chromium	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Copper	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U
Iron	8.4 U	8.4 U	8.4 U	8.4 U	8.4 U	8.4 U
Lead	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
Nickel	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U	4.2 U
Silver	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U	3.3 U
Thallium	2.7 U	2.7 U	2.7 U	13.5 U	2.7 U	2.7 U
Zinc	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U	4.8 U
Cyanide	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U

Semi-volatiles - 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles - 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides - 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides - 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

SAMPLE QUANTITATION LIMITS
EPA CASE #19918

Sample Identification:	MW6	PB1
Date Sampled:	5/5/93	5/5/93
Organic Traffic Report Number:	ETW08	ETW11
Units:	µg/L	µg/L
Volatiles	10 U	10 U
Semi-volatiles - 1	10 U	10 U
Semi-volatiles - 2	25 U	25 U
Pesticides - 1	0.050 U	0.050 U
Pesticides - 2	0.10 U	0.10 U
Methoxychlor	0.50 U	0.50 U
Toxaphene	5.0 U	5.0 U
Aroclor 1221	2.0 U	2.0 U
Other Aroclors	1.0 U	1.0 U
	METL08 µg/L	METL11 µg/L
Aluminum	19.2 U	19.2 U
Beryllium	0.30 U	0.30 U
Cadmium	1.4 U	1.4 U
Chromium	3.3 U	3.3 U
Copper	2.7 U	2.7 U
Iron	8.4 U	8.4 U
Lead	0.6 U	0.6 U
Nickel	4.2 U	4.2 U
Silver	3.3 U	3.3 U
Thallium	13.5 U	2.7 U
Zinc	4.8 U	4.8 U
Cyanide	10.0 U	10.0 U

Semi-volatiles - 1

Phenol, bis(2-chloroethyl)ether, 2-chlorophenol, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, 2-methylphenol, 2,2'-oxybis(1-chloropropane), 4-methylphenol, n-nitroso-di-n-propylamine, hexachloroethane, nitrobenzene, isophorone, 2-nitrophenol, 2,4-dimethylphenol, bis(2-chloroethoxy)methane, 2,4-dichlorophenol, 1,2,4-trichlorobenzene, naphthalene, 4-chloroaniline, hexachlorobutadiene, 4-chloro-3-methylphenol, 2-methylnaphthalene, hexachlorocyclopentadiene, 2,4,6-trichlorophenol, 2-chloronaphthalene, dimethylphthalate, acenaphthylene, 2,6-dinitrotoluene, acenaphthene, dibenzofuran, 2,4-dinitrotoluene, diethylphthalate, 4-chlorophenyl-phenyl ether, fluorene, n-nitrosodiphenylamine, 4-bromophenyl-phenyl ether, hexachlorobenzene, phenanthrene, anthracene, carbazole, di-n-butylphthalate, fluoranthene, pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, benzo(b)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, benzo(g,h,i)perylene

Semi-volatiles - 2

2,4,5-trichlorophenol, 2-nitroaniline, 3-nitroaniline, 2,4-dinitrophenol, 4-nitrophenol, 4, nitroaniline, 4,6-dinitro-2-methylphenol, pentachlorophenol

Pesticides - 1

alpha-BHC, beta-BHC, delta-BHC, gamma-BHC(Lindane), Heptachlor, Aldrin, Heptachlor epoxide, Endosulfan I, alpha-Chlordane, gamma-Chlordane

Pesticides - 2

Dieldrin, 4,4'-DDE, Endrin, Endosulfan II, 4,4'-DDD, Endosulfan sulfate, 4,4'-DDT, Endrin ketone, Endrin aldehyde

Appendix E

MDNR Electromagnetometer Survey Report

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

November 30, 1993

TO: George Carpenter, Superfund Section
Environmental Response Division

FROM: Chris Austin, Geologist
Geological Services Section
Environmental Response Division

SUBJECT: Cooper School, Wayne County

The Geological Services Section (GSS) conducted an electromagnetic (EM-31) and Geoprobe study at Cooper School to provide an assessment of buried refuse locations, groundwater quality, and clay topography. Cooper School is in Livonia, Michigan, Section 1, T2S-R9E.

Electromagnetics (EM) provides a means of measuring the electrical conductivity of subsurface soils, rock, and groundwater. It is also useful for the detection of conductive buried metals. Electrical conductivity is a function of the soil or rock type, porosity, permeability, and the liquids that occupy pore spaces within the soil/rock. The conductivity of the pore fluids will usually dominate the measurement. Conductivity is defined as the ability of a medium to transmit an electric current. A medium that can pass an electric current easier than another has a higher conductivity (clays and metals have higher conductivities than most sands).

Many contaminants will produce a change in the amount of dissolved free ions present in the groundwater or soils. Changes in levels of ions will cause a change in the conductivity. Conductivity changes stand out as an anomalous high or low value when mapped and compared to background readings. These differences in conductivity allow the EM technique to map geologic conditions as well as many contaminant plumes.

The EM instrument has both a transmitter coil and receiver coil. An alternating current passing through the transmitting coil generates a primary magnetic field. This oscillating magnetic field induces alternating electrical currents (eddy currents) in the earth. These eddy currents create a secondary magnetic field. The receiver coil senses the secondary and primary field and produces an output voltage to the instrument readout. This reading is a composite conductivity reading from the surface to the effective depth of the instrument.

Electromagnetics is also an excellent method for detecting buried metals. Oscillating, secondary, and primary magnetic fields differ in phase. The secondary field has components that are in-phase and out-of-phase with the primary field. In-phase components increase in magnitude with very good conductors (buried metals). Measuring the in-phase signal, therefore, detects buried metals.

Electromagnetics data acquisition is rapid. Therefore, the EM technique is an excellent reconnaissance tool for tracking certain contaminant plumes, locating buried metals, and detecting pit and trench locations of bulk waste.

Cultural features at Cooper School varied in nature (underground utilities, metal fences, and overhead power lines). These features interfere with most remote sensing techniques. GSS carried out the EM-31 survey by traversing the ground in a grid pattern and running traverse lines in a south to north orientation with survey stations every ten feet.

Superfund Section requested GSS minimize the amount of brushing at the site; therefore, areas of dense brush and trees were excluded from the study.

Staff from GSS surveyed the area surrounding Cooper School using the EM-31 (Fig 1). Contours on Figure 1 represent changes in conductivity (values are expressed in milliohms/meter). The study indicated that most of the area contains refuse and scattered buried metal. The north-central and southeast portions of the site have the highest conductivities. Due to the dense brush, the limits of the refuse could not be determined.

The Geoprobe system provides a means of obtaining water, soil, and soil vapor samples. The system uses a van-mounted, hydraulically driven ram unit. The unit drives a one inch outside diameter hollow rod into the ground. Each threaded hollow rod is three feet long. Soil, water, or soil gas samples are obtained through the rod. The geoprobe unit has an on-board portable gas chromatograph. This chromatograph allows for real time sample analysis for volatile organic compounds of the collected samples.

To define groundwater quality and clay topography, GSS completed 34 micro-soil borings (MSB). Seven of the micro-soil borings were completed as temporary monitor wells (TMW): TMW-1, TMW-2, TMW-3, TMW-4E, TMW-4W, TMW-6, TMW-7. TMW-5 was not drilled. Micro-soil borings not completed as temporary monitor wells are number MSB 1-27. George Carpenter and Joe Walczak from the Pre-Remedial Unit, Superfund Section, determined micro-soil boring locations.

Each temporary monitor well was driven to a depth of about 4-16.5 feet below the ground level (approximate top of the saturated zone). The GSS inserted a one inch diameter galvanized steel casing, screened with stainless steel, into the pre-driven hole. Upon completion of the temporary monitor wells, staff from the Superfund Section collected groundwater samples from each temporary monitor well. GSS staff surveyed temporary monitor wells and micro-soil borings for horizontal and vertical control (Table 1, Table 2).

Figure 1 (attached) shows micro-soil boring locations and clay elevations. Clay tops were determined by Joe Walczak from the Superfund Section. Clay elevations suggest a possible ravine. This ravine appears to have northwest-southeast orientation which shows a parallel to the underground drain. This ravine could form a pathway for migrating groundwater. To define the boundaries of the ravine, additional micro-soil borings are needed.

TABLE 1

SOIL BORING	*GROUND ELEVATION (assumed bench)*	*SOIL BORING*	*GROUND ELEVATION (assumed bench)*
MSB-1	98.16'	MSB-15	98.48'
MSB-2	97.99'	MSB-16	98.35'
MSB-3	92.66'	MSB-17	98.16'
MSB-4	92.64'	MSB-18	96.94'
MSB-5	93.72'	MSB-19	103.33'
MSB-6	91.90'	MSB-20	102.46'
MSB-7	not survey	MSB-21	101.10'
MSB-8	89.76'	MSB-22	104.16'
MSB-9	96.25'	MSB-23	not survey
MSB-10	99.04'	MSB-24	102.35'
MSB-11	99.17'	MSB-25	99.84'
MSB-12	98.96'	MSB-26	102,52'
MSB-13	98.20'	MSB-27	99.56'
MSB-14	96.94'		

TABLE 2

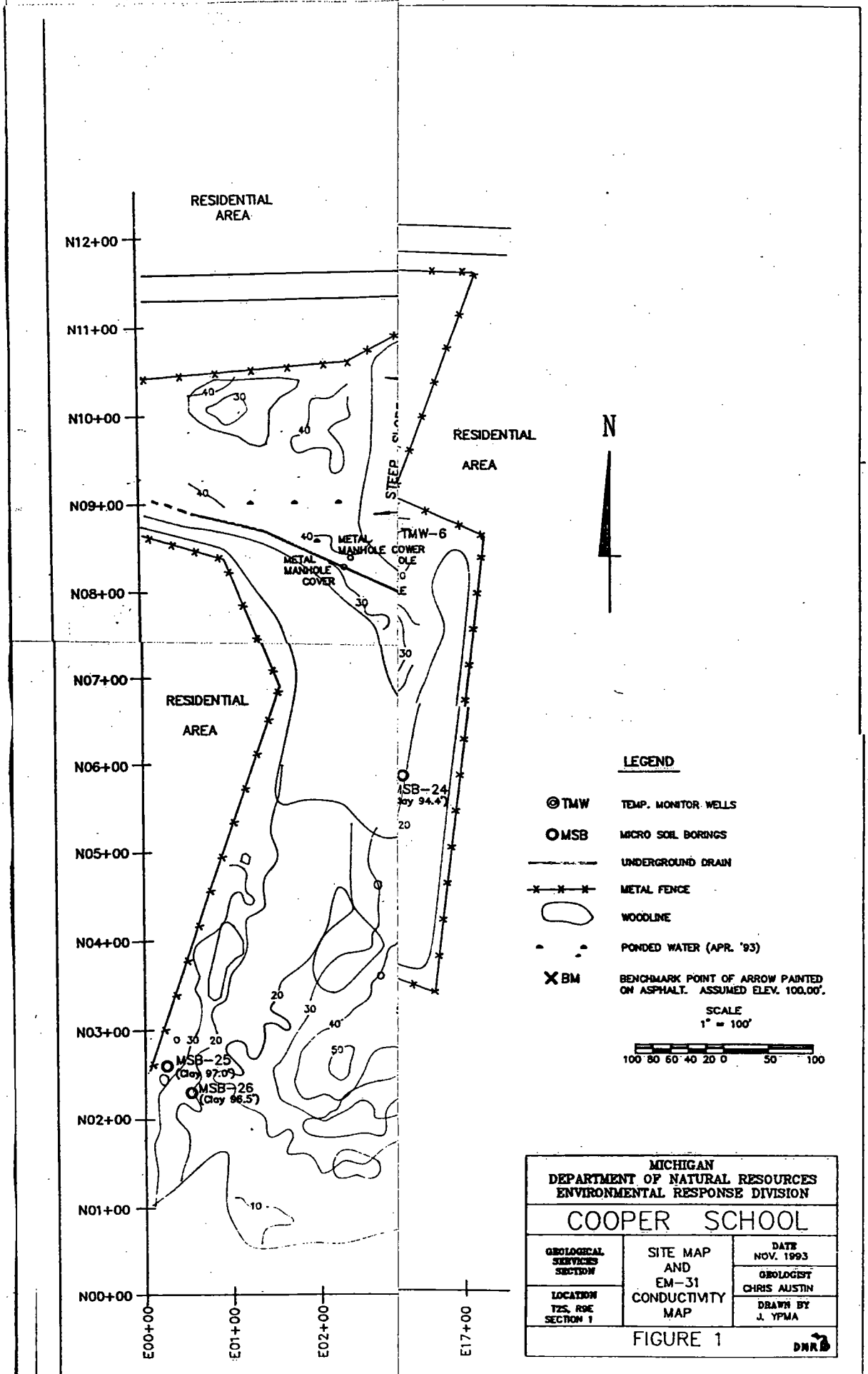
Monitor well	*Ground elevation (assumed bench mark)*
TMW-1	98.08'
TMW-2	91.21'
TMW-3	90.10'
TMW-4 east	96.62'
TMW-4 west	97.97'
TMW-6	not surveyed
TMW-7	103.39'

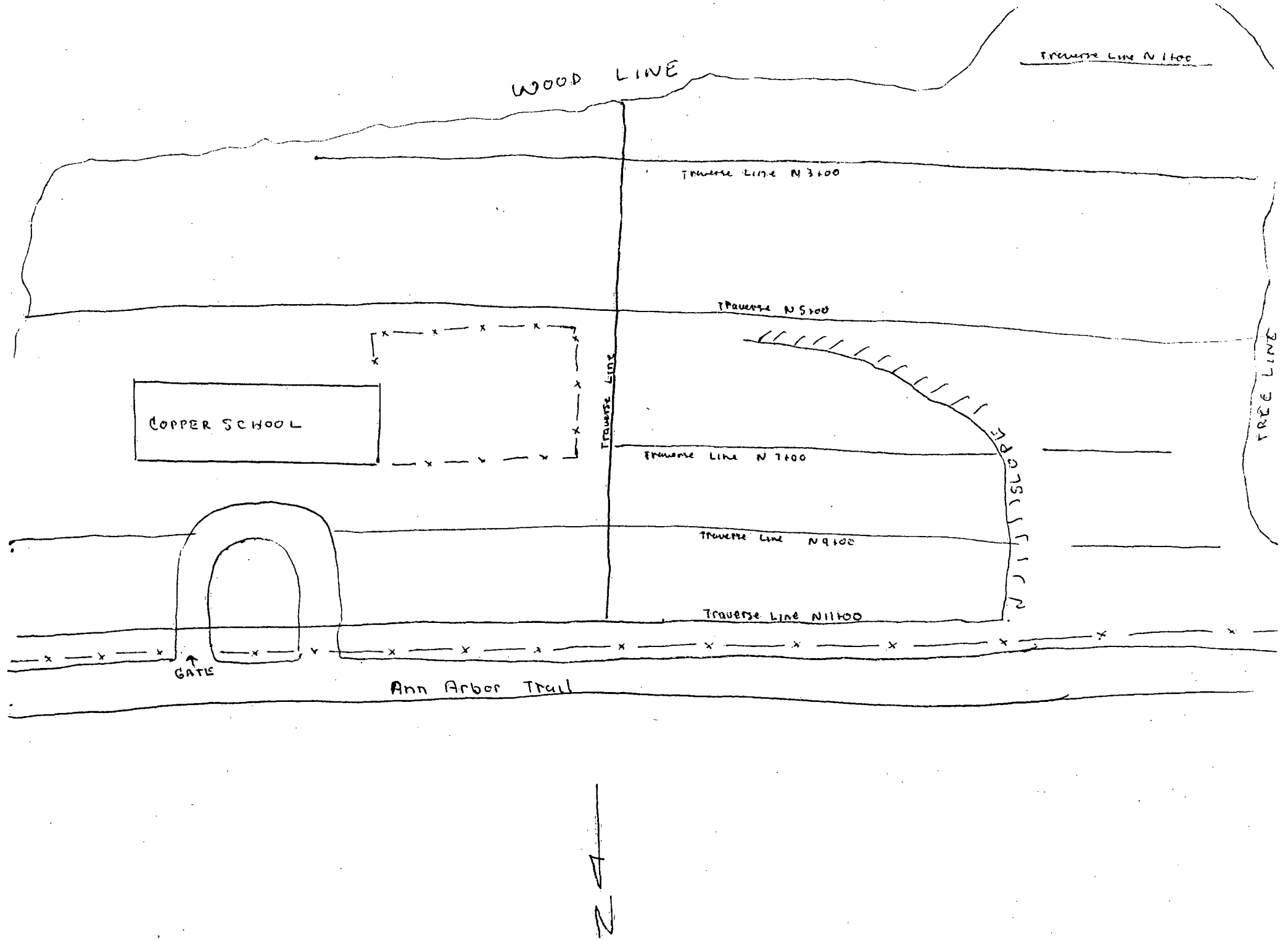
If you have any questions or comments, profs (Austinc) or call me. I will be in the Crystal Falls office.

Attachment

cc: B. Iversen

Chris Austin


RESIDENTIAL AREA
RESIDENTIAL AREA
RESIDENTIAL AREA
STEEP SLOPE
N12+00
N11+00
N10+00
N09+00
N08+00
N07+00
N06+00
N05+00
N04+00
N03+00
N02+00
N01+00
N00+00
E00+00
E01+00
E02+00
E17+00
TMW-6
METAL MANHOLE COVER
METAL MANHOLE COVER
MSB-24 (Clay 94.4')
MSB-25 (Clay 97.0')
MSB-26 (Clay 96.5')
40
30
20
10
0
N
LEGEND
TMW TEMP. MONITOR WELLS
MSB MICRO SOIL BORINGS
UNDERGROUND DRAIN
METAL FENCE
WOODLINE
PONDED WATER (APR. '93)
BM BENCHMARK POINT OF ARROW PAINTED ON ASPHALT. ASSUMED ELEV. 100.00'.
SCALE
1" = 100'
100 80 60 40 20 0 50 100
MICHIGAN
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL RESPONSE DIVISION
COOPER SCHOOL
GEOLOGICAL SERVICES SECTION
SITE MAP AND EM-31 CONDUCTIVITY MAP
DATE NOV. 1993
GEOLOGIST CHRIS AUSTIN
LOCATION T2S, R9E SECTION 1
DRAWN BY J. YPMA
FIGURE 1
DNR


WOOD LINE
Traverse Line N 1400
Traverse Line N 3400
Traverse N 5400
Traverse Line
COPPER SCHOOL
Traverse Line N 7400
Traverse Line N 9400
Traverse Line N11400
GATE
Ann Arbor Trail
TREE LINE

Appendix F

Soil Boring Logs

COOPER SCHOOL ESI BORING NOTES SUMMARY
August 16 - 20, 1993

BORING NUMBER	DEPTH	LOG NOTES
1	0-4"	topsoil, clayey loam
	4-20"	dry, mottled clay, rusty, mixed with glass
	20-24"	rusty sand, glass
	24-36"	sand, fine gravel, glass pieces, cinders, auger refused by brick
	36-48"	refused by brick
	48-60"	iron stained sand, glass, copper pipe piece
	60-62"	dense red clay tile
	62-66"	same refuse including cinders
	72-90"	same refuse including cinders
	90-96"	black cinders, black, sand, glass
	8-10'	spoon plugged-1 ft fill one chunk of crumbling concrete, jammed at 9ft by solid glass just above a 2" plug of gray clay outside of spoon damp at 9ft
	10-12'	1 ft recovery, bottom 2" soil moist fine sand, 6" above that mixture of sand, glass some clay, rest to top same refuse as 8-10 ft
	12-14'	water sand didn't hold in spoon
	14-16'	5" from bottom of spoon dense slightly sandy slate gray clay, overlying is water, fine sand
	16-18'	dense slate gray clay EOB
2	0-8'	no spoons run to 8 ft
	8-10'	1 ft recovery in spoon, charcoal gray cinder, medium gravel, wood chunks & glass in bottom 4", wood damp
	10-12'	1 ft recovery, black ash & cinder, some glass, 3 wood plugs, 1 piece of metal (aluminum?) bottom 9" moist
	12-14'	8" recovery, wet, 1" plug gray clay at bottom, wood fragments & glass above
	14-16'	6" recovery, wet, black clayey loam type material with glass and medium gravel, mud clay plug at bottom
	16-18'	16" recovery, bottom 6" light gray pasty clay, 6" of same black clayey loam as 14-16, rest above is refuse
	18-20'	spoon empty, water sand fall out?
	20-22'	2ft recovery, 18" brown clay at bottom grades to light gray, brown clay in top 6" EOB
3	0-2'	no spoon run
	2-4'	2 ft recovery, light brown to dark brown clayey sand, fill material, trace gravel
	4-13'	no spoons run, soft material, some stones, resistance at 13'
	13-15'	moist brown/gray silty clay, trace sand & gravel,

BORING NUMBER	DEPTH	LOG NOTES
		hole moist at 5', wet at 6.5' grouted hole, new hole to find top of clay
3(repeat)	0-8'	no spoons run
	8-10'	18'' recovery, brown to gray to green silty clay interlayered with black to gray sandy clay & gray/brown silt
3(repeat)	0-6.5'	no spoons run
	6.5-8.5'	refuse to 8ft, brown, silty clay at 8ft EOB
4	0-7'	no spoons run
	7-9'	4" recovery, brown gravel & sand fill, wet
	9-11'	no recovery, spoon wet, possible sand & gravel fall out of spoon?
	11-13'	18" recovery, 1st 6" black to gray clayey sand, wet with trace gravel, bottom 12' brown, stiff silty clay, some gray streaking, trace gravel, clay at 12' EOB
5	0-7'	no spoons run
	7-9'	2'ft recovery, 18" scharcoal gray clayey sand fill material with some vegetation-no structure, 6" brown to gray, silty clay
5(repeat)	0-5.5'	no spoons run
	5.5-7.5'	8" recovery, gray to brown fill material
	7.5-9.5	2ft recovery, 1ft charcoal gray clayey sand, 1ft brown gray silty clay, trace gravel EOB
6	0-5'	no spoons run
	5-7'	brownish gray clayey sand fill
	7-9'	brown to gray to black clayey fill, some wood and gravel
	9-11'	1ft recovery, brown fill material, 6" brown clay on bottom
	11-13'	1ft recovery, all clay brown grading to gray silty clay with trace sand and gravel EOB
7		aborted, possibly hit culvert-bent spoon & 6' of pipe decided to move boring half way between 7 and 8 - log of SB8 is this relocated SB
8	0-7'	no spoons run
	7-9'	16" recovery, 10" wet gray, clayey fine to medium sand over 6" moist, brown to gray silty clay with trace sand & gravel, (clay at 8.5ft)

BORING NUMBER	DEPTH	LOG NOTES
8(cont)	9-11′	1ft recovery, stone in end of spoon, 1ft brown silty clay with trace sand & gravel EOB
9	0-15′	no spoons run
	15-17′	18" recovery, moist brown to gray sandy clay to clayey sand with trace gravel
	17-19	2" recovery, silty fine to medium sand, wet sandy layer hole collapsed at 18ft
	19-21′	2ft recovery, moist gray clay at 19′, with little sand, trace gravel EOB
10	0-9′	no spoons run resistance cleared at 5ft depth
	9-11′	1" brown sand, 1.5 ft brown clay with some small gravel, gray clay striations becoming more pronounced with depth, 0.5 ft 75% gray clay, 25% brown clay
	11-13′	3" gray clay sheathed in brown clay, 21" brown clay mixed with small gravel
	13-15′	2ft brown clay with smattering of gravel EOB
10(repeat)	0-7′	no spoons run
	7-9′	6" dirt & sand, 1.5 ft brown clay, chunky EOB
11	0-7′	no spoons run
	7-9′	mixed sand, brown soil, glass shards, brick
	9-11′	6" recovery, same fill material
	12-14′	same fill material, end of spoon wet
	14-16′	same fill, at about 1 ft in spoon, wet sand mixed with clay, 1" tip appeared to be start of clay
	16-18′	2 ft recovery, 1 ft wet gray clay & some sand over 1 ft moist gray clay clay, dark gray clay, some sand moist, at bottom of spoon, clay balling
	18-20′	missed core
	20-22′	2 ft gray clay EOB
12		drilling resistance at 5 to 8 ft (clay at 5?)
	16-18′	18" gray clay and sand, moist at 17′,
	18-19′	gray clay, moist, malleable EOB
13		drilling resistance at 5 to 10 ft (clay at 5?)
	16-18′	6-8" dark gray clay/sand mix, moist, 8" good gray clay, moist, 3" gray clay/sand mix, moist
	18-20′	8" solid gray clay EOB

BORING NUMBER	DEPTH	LOG NOTES
14		drilling resistance at 5 to 8 ft (clay at 5?)
	16-18′	8" mix of brown/gray clay and sand, 2" gray clay some sand, 8" gray to brown clay/sand mix, very wet
	18-20′	2" sand/clay mix, moist, 18" gray clay becoming brown with gravel mix, bottom 1 ft very moist all clay to 20 ft EOB
15		drilling resistance 5 to 8 ft (clay at 5?)
	16-18′	2" gray clay/sand mix, 7" gray clay, 7" gray clay with brown staining (?) coloration, 1" clay/sand mix (all moist)
	18-20′	1" gray clay/sand mix, moist, 3" gray clay, 1" gray clay/sand mix, moist, believe majority of sample fell out of sleeve
	20-22′	1" brown sand, 23" brown clay EOB
16	0-16′	no spoons run
	16-18′	18" recovery, gray very moist to wet sandy clay mixed with clayey sand - some root & vegetative material
	18-20′	12" recovery, same gray sandy clay to clayey sand, wet sand from 19-20ft - no recovery
	20-22′	2 ft recovery, solid gray silty clay with trace sand and gravel, clay at 20 ft EOB
17	0-15′	no spoons run
	15-17′	18" recovery, gray moist sandy clay interlayered with clayey sand layers
	17-19′	same gray clayey sand, grades down silty/clayey fine to medium sand at 19ft
	19-21′	20" recovery, 2-3" gray clayey sand, wet, 17-18" medium brown to gray silt clay with trace sand & gravel, clay at 19′8" EOB
18	0-15′	no spoons run
	15-17′	gray moist sandy clay to clayey sand - not as wet as previous holes
	17-19′	20" recovery, 4" gray very moist sandy clay, 16" brown to gray moist silty clay with trace sand & gravel, clay at 17′8" EOB
19	0-2′	10" recovery, 2" topsoil, 8" brown dry sandy clay

BORING NUMBER	DEPTH	LOG NOTES
		fill, some glass
19(cont)	2-4′	no recovery - stone in front of spoon
	4-6′	6" recovery, black to dark blue construction debris - wood with nails, some sand
	6-8′	black silty sand & clay, slight organic smell, only 2" recovery
hole going crooked, moved 6" north		
	6-8′	2" recovery, black sand with construction debris
	8-10′	no recovery, looks like dark gray to black wet sandy material on outside of spoon
	10-12′	16" recovery, 1" black wet sandy material, 15" brown to gray silty clay with trace sand & gravel, solid clay at 10′9" EOB
20	0-2′	10" recovery, 2" topsoil, 8" light brown dry sandy clay & gravel - some glass at around 2ft
	2-4′	10" recovery, brown to rusty brown silty to clayey sand - fill
	4-6′	12" recovery, dark brown silty sand with clay fill material
	6-8′	12" recovery, 10" dark gray to black silty fine sand with some clay - possibly fine foundry sand? (Carp saw this later, said not foundry sand)
	8-10′	22" recovery, 1" gray, moist, silty fine sand (as above), 21" brown to gray silty clay with trace sand & gravel Clay at 8′10" EOB
21	0-2′	14" recovery, 3" topsoil, 6" light brown, dry silty fine sand with little clay, 5" dark gray silty sand & refuse
	2-4′	12" recovery, light to dark brown silty fine sand
	4-6′	16" recovery, brown to gray fine to medium sand very clean, water at 5.5 ft
	6-8′	22" recovery, 6" wet gray, clean fine to medium sand, 16" brown to gray silty clay with trace sand & gravel Clay at 6′6" EOB
22	0-2′	12" recovery, 5" topsoil, 7" red brown dry silty sand with trace clay & gravel, some debris in bottom of spoon
	2-4′	14" recovery, light brown silty fine sand, clean
	4-6′	14" recovery, same as 2-4′
	6-8′	16" recovery, same as 2-6′, sand getting moister
	8-10′	20" recovery, 14" wet brown silty sand, 6" gray silty clay, clay at 7′6"

BORING NUMBER	DEPTH	LOG NOTES
22(cont)	10-12′	2′ recovery, gray silty clay with trace sand & gravel EOB
23	front of school 44′6" ENE of middle roof corner, 14′6" WSW of window corner, 41′ ESE of front corner of bldng arm	
	0-2′	no spoon run
	2-4′	9" recovery, rusty fine gravel, glass, plastic, one cinder
	4-6′	6" recovery, 1" tan clay, rusty fine gravel, glass, brick fragments - spoon point had white powdery end fine like dry wall but not moist plugged spoon?
	6-8′	12" recovery, 6" granular rotten white cement, 2" tar, 4" sandy tan clay of which last inch is thick clay no sand
	8-10′	14" recovery, 1" tan brown clay, 3" clayey sand, 10" medium to coarse sand, wet to 8" from bottom EOB
24	Chris surveyed as SB24	
	0-4′	no spoons run
	4-6′	18" recovery, 4" rusty medium sand, glass, some cinder, 8" golden brown sand no refuse, grading to yellow & tan gray sand at bottom 6"
	6-8′	18" recovery, 14" same tan gray sand as bottom of 4-6′, 2" clayey sand, moist, 2" plug of dense gray clay at bottom
	8-10′	24" recovery, all dense gray clay EOB
25	near west fence 50′	
	0-2′	24" recovery, 2" peat soil, 4" sandy clay, 10" dry clay grading to fine sand for last 8"
	2-4′	24" recovery, 8" fine gold brown sand, 16" dry solid gray clay
	4-6′	24" all solid gray clay, dry EOB
26	50′ east of SB25	
	0-2′	6" recovery, 4" topsoil, 2" glass, rusty medium sand, dry - rest fall out of spoon?
	2-4′	6" recovery, 2" sand above 2" gray sand, 2" rusty sand, 50% glass fragments - rest fall out of spoon?
	4-6′	6" recovery, top 4" red rusty sand, gravel, glass, bottom 2" rusty sand layered with black tar, dry, last 1/2" gray brown sand loam - former topsoil?
	6-8′	24" recovery, all dense gray brown clay, top 1"

BORING NUMBER	DEPTH	LOG NOTES
26(cont)	6-8'(cont)	had sandy clay barely moist EOB
27	Chris shot as SB22	
	0-2'	24" recovery, 4" clayey loam, 6" sandy clay, 1" rotten dry white concrete, 13" brown sand some gravel, glass, brick, rotten cloth
	2-4'	16" recovery, top 10" gravelly brown sand containing glass grading to gold sand at bottom 2", no glass in gold sand, 6" gray brown dense clay
	4-6'	24" recovery, all gray dense clay EOB

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School – Westland								SB-1
COUNTY:	TOWNSHIP:	TOWN–RANGE:	SECTION:	1/4	DRILL METHOD:	SURFACE PROTECTION:	TOTAL DEPTH:	
WAYNE		T2S R8E	1		HSA		4ft	
DRILLER:	LOGGER:	START:	END:		LOCATION ON SITE: South side of 8904 Brady – 72 ft East of intersection Brady and Cedar		WELL/BORE DIA:	
Eckley	Nance	6/6/91	6/6/91					
CASING DIA:	TYPE:	* CME 5ft continuous Sampler			ROCK CORE:		ELEV.–TOC:	
					BIT TYPE:			
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.:		ELEV.–GROUND:	
					DRILLING FLUID USED:			

SAMPLE #	SAMPLE TYPE	RECOVERY	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
1	*	100				0		Topsoil – black, loam	STC 0 0
						4		EOB – No refusal encountered hole abandoned Too close to water line. Hole backfilled with cuttings – topped off with bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School – Westland								SB-2
COUNTY: Wayne	TOWNSHIP:	TOWN–RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 9.5 Ft	
DRILLER: Eckley	LOGGER: Noyce	START: 8/6/91	END: 8/6/91		LOCATION ON SITE: NE Corner of Brody and 23rd St		WELL/BORE DIA:	
CASING DIA:	TYPE: * CME - 5ft continuous Sampler				ROCK CORE: BIT TYPE:		ELEV.–TOC:	
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: DRILLING FLUID USED:		ELEV.–GROUND:	

SAMPLE #	SAMPLE TYPE	RECOVERY ~~TYPE~~	SAMPLE BLOWS	ELEV. / WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
1	*	100			0		Topsoil - Sandy	PID 0.0
							Silt Loam - brown, dry	PID 0.0
2	*	100			5		Clay - brown and gray, Mottled	PID 0.0
					10		EOB - No refuse encountered. Hole backfilled with bentonite topped off with concrete	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School - Westland								SE-3
COUNTY: WAYNE	TOWNSHIP:	TOWN-RANGE: T2S - R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 9.5'	
DRILLER: Eckley	LOGGER: Noyce	START: 8/6/91	END: 8/6/91		LOCATION ON SITE: School Property E/S of 29098 Brody		WELL/BORE DIA:	
CASING DIA:	TYPE: * CME - 5ft continuous sampler				ROCK CORE: BIT TYPE:		ELEV.–TOC:	
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: DRILLING FLUID USED:		ELEV.–GROUND:	

SAMPLE #	SAMPLE TYPE	RECOVERY ~~TYPE~~	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
								Topsoil - sandy	OED 0.00
1	*	100						Sand - fine to medium, brown, dry	PID 0.00
						5		Sand - fine to medium, brown, wet at 6.5 ft	OID 0.00
2	*	100						Clay - silt, brown and gray, mottled	PID 0.00
						10		EOB - no refusal Soil cuttings drumed per school's request Hole sealed with bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School – Westland								SE-4
COUNTY: Wayne	TOWNSHIP:	TOWN-RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 9.5 ft	
DRILLER: Eckley	LOGGER: Noyce	START: 2/6/91	END: 2/6/91		LOCATION ON SITE: School Property East of 29064 Brody		WELL/BORE DIA:	
CASING DIA:	TYPE:	* CME - Continuous 5 ft sampler			ROCK CORE: BIT TYPE:		ELEV.–TOC:	
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: DRILLING FLUID USED:		ELEV.–GROUND:	

SAMPLE #	SAMPLE TYPE	RECOVERY ~~TYPE~~	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
								Topsoil - sandy	PID - 0.00
								Sand - fine to medium, brown	PID - 0.00
1	*	100							
						5		Sand - Fine to medium, brown	PID - 0.00
								Clay - Gray and brown mottled	PID - 0.00
2	*	100							
						10		EOB	
								No release encountered soil cuttings drummed per Schools request - Hole filled w/ bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School - Westland								SB-5
COUNTY:	TOWNSHIP:	TOWN–RANGE:	SECTION:	1/4	DRILL METHOD:	SURFACE PROTECTION:	TOTAL DEPTH:	
WAYNE		T25-R9E	1		HSA		9.5 ft	
DRILLER:	LOGGER:	START:	END:		LOCATION ON SITE: School Property East of 22014 Reedy		WELL/BORE DIA:	
Eckley	Noyce	8/6/91	8/6/91					
CASING DIA:	TYPE:	* CME Continuous 5 ft Sampler			ROCK CORE:		ELEV.–TOC:	
					BIT TYPE:			
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.:		ELEV.–GROUND:	
					DRILLING FLUID USED:			

SAMPLE #	SAMPLE TYPE	RECOVERY TYPE	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
						0		SAND - very fine, brown, and silt	PID 0.00
1	*	100						SANDY LOAM - Brown with occasional sand lenses	PID 0.0
						5		Clay - Brown and gray mottled	PID 0.0 out of hole — may be due to rig exhaust
2	*	100							Core - 0.00
						10		EOB No refusal encountered. Soil cuttings rinsed per Cassie request. Hole filled with bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School - Wetland								SB-6
COUNTY: Wayne	TOWNSHIP:	TOWN-RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 9.5	
DRILLER: Eckley	LOGGER: Noyce	START: 8/6/91	END: 8/6/91		LOCATION ON SITE: School Property East of 2901S Brody		WELL/BORE DIA:	
CASING DIA:	TYPE:	* CME Continuous 5' Sampler			ROCK CORE: BIT TYPE:		ELEV.–TOC:	
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: DRILLING FLUID USED:		ELEV.–GROUND:	

SAMPLE #	SAMPLE TYPE	RECOVERY ~~TYPE~~	SAMPLE BLOWS	ELEV. / WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
					0		Topsoil - Sandy	[illegible]
1	*	100					Clay - Brown and gray mottled, sandy, with sand lenses	PID 0.0
					5			
2	*	100					Clay - Stiff brown and gray mottled	PID 0.0
					10		EOB No refusal encountered Soil cuttings drummed per school's request Hole filled with bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School - Westland								SB-7
COUNTY: Wayne	TOWNSHIP:	TOWN-RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 14.5 ft
DRILLER: Eckley	LOGGER: Noyce	START: 8/7/91	END: 8/7/91		LOCATION ON SITE: 29054 Brody - Lawn Extension		WELL/BORE DIA:
CASING DIA:	TYPE:	* CME continuous 5 ft sampler			ROCK CORE: BIT TYPE:		ELEV.–TOC:
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: DRILLING FLUID USED:		ELEV.–GROUND:

SAMPLE #	SAMPLE TYPE	RECOVERY	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
						0		Topsoil	PID 0.00
1	*	100						Clay - gray and brown mottled	PID 0.00
						5		Clay - firm, gray and brown mottled	PID 0.00
2	*	100						Clay - soft, gray	PID 0.00
						10		Clay - soft, gray with saturated, brown fine silty sand seams	PID 0.00
						15		EOB No refusal encountered. Hole filled with cuttings. Topped with bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION: Cooper School – Westland						PAGE # OF	HOLE # SC-8
COUNTY: Wayne	TOWNSHIP:	TOWN–RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA / SURFACE PROTECTION:	TOTAL DEPTH: 9.5 ft	
DRILLER: Eckley	LOGGER: Noyce	START: 2/7/91	END: 2/7/91		LOCATION ON SITE: 29098 Brody – Lawn extension	WELL/BORE DIA:	
CASING DIA: / TYPE:	* CME – continuous 5 ft sampler				ROCK CORE: / BIT TYPE:	ELEV.–TOC:	
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: / DRILLING FLUID USED:	ELEV.–GROUND:	

SAMPLE #	SAMPLE TYPE	RECOVERY	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
						0		Top soil	
1	*	90				1		SAND – fine to medium, brown, silty	OVA – 0.00
								CLAY – Silty, gray and brown mottled with coal seam	PID – 0.00
2	*	5				5		Clay – Silty, gravelly, stone blocked core barrel – logged as Augers	OVA – 0.00 from cuttings
						10		EOB – No refuse encountered Hole sealed with cuttings and bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION: Cooper School - Wetland						PAGE # OF	HOLE # SB-9
COUNTY: Wayne	TOWNSHIP:	TOWN-RANGE: T25-R9E	SECTION: 1	1/4	DRILL METHOD: HSA / SURFACE PROTECTION:		TOTAL DEPTH: 9.5
DRILLER: Eckley	LOGGER: Noyce	START: 8/7/91	END: 8/7/91		LOCATION ON SITE: 29934 Brody - Lawn extension		WELL/BORE DIA:
CASING DIA: / TYPE:	* CME - continuous 5-ft Sampler				ROCK CORE: / BIT TYPE:		ELEV.-TOC:
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: / DRILLING FLUID USED:		ELEV.-GROUND:

SAMPLE #	SAMPLE TYPE	RECOVERY ~~TYPE~~	SAMPLE BLOWS	ELEV. / WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
					0		Topsoil	DID - 0.00
							Sand - fine, brown, silty	
1	*	100					Clay - firm, gray and brown mottled with sand seams	CID - 0.00
								PID - 0.00
					5		Clay - firm, brown and gray mottled	ICD - 0.00
2	*	100					Clay - firm gray	PID - 0.00
					10		EOB - No refusal encountered Hole filled with cuttings and bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School - Westland								SB-10
COUNTY: Wayne	TOWNSHIP:	TOWN–RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 9.5 ft
DRILLER: Eckley	LOGGER: Noyce	START: 6/19/91	END: 6/19/91		LOCATION ON SITE: 28527 Ann Arbor Trail – Backyard		WELL/BORE DIA:
CASING DIA:	TYPE:	* CME - continuous 5ft sampler			ROCK CORE: BIT TYPE:		ELEV.–TOC:
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: DRILLING FLUID USED:		ELEV.–GROUND:

SAMPLE #	SAMPLE TYPE	RECOVERY ~~TYPE~~	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
1	*	100				0		Topsoil	
								Sand - fine to medium, brown	SB1 0.00
								Clay - firm, brown and gray mottled	SB1 0.00
								Clay - firm, gray and brown mottled	SB1 0.00
2	*	100						Clay - firm, gray	SB1 0.00
						10		EOB - No free water encountered. Hole filled with cuttings and bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School – Westland								SB-11
COUNTY:	TOWNSHIP:	TOWN–RANGE:	SECTION:	1/4	DRILL METHOD:	SURFACE PROTECTION:	TOTAL DEPTH:	
Wayne		T2S-R9E	1		HSA		9.5 ft	
DRILLER:	LOGGER:	START:	END:		LOCATION ON SITE: 28335 Ann Arbor Trail – backyard		WELL/BORE DIA:	
Eckley	Noyce	8/7/91	8/7/91					
CASING DIA:	TYPE:	* CME – continuous 5 ft sampler			ROCK CORE:		ELEV.–TOC:	
					BIT TYPE:			
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.:		ELEV.–GROUND:	
					DRILLING FLUID USED:			

SAMPLE #	SAMPLE TYPE	RECOVERY	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
						0		Topsoil	PID 0.0
1	*	100						SAND – fine to medium, brown	PID 0.5
						5		CLAY – firm, gray and brown mottled	PID 0.9 @ 4.5'
2	*	100							PID 0.3 @ 8.5'
						10		EOB No refuse encountered Area disturbed – fill soils, rubbish on surface Hole filled with cuttings and bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION: Cooper School - Westland						PAGE # OF	HOLE # SB-12
COUNTY: Wayne	TOWNSHIP:	TOWN-RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 9.5 ft
DRILLER: Eckley	LOGGER: Noyce	START: 8/7/91	END: 8/7/91	LOCATION ON SITE: Behind Whittier School - West side of Basketball court			WELL/BORE DIA:
CASING DIA:	TYPE: * CME - continuous 5 ft sampler			ROCK CORE: BIT TYPE:			ELEV.-TOC:
SCREEN: TYPE/DIA:	LENGTH:	SLOT:		CORED HOLE DIA.: DRILLING FLUID USED:			ELEV.-GROUND:

SAMPLE #	SAMPLE TYPE	RECOVERY	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
								Topsoil	PID 0.2 background
1	*	100						Clay - firm, brown and gray mottled with sandy clay seams - fill material	PID 0.5 in seams
						5		Clay - brown and gray mottled with thin sand partings	PID 0.8 in partings
2	*	100							
						10		EOB - no refusal encountered. Hole filled with cuttings and bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School - Westland								SE-13
COUNTY:	TOWNSHIP:	TOWN–RANGE:	SECTION:	1/4	DRILL METHOD:	SURFACE PROTECTION:	TOTAL DEPTH:	
Wayne		T2S-R9E	1		HSA		14.5 ft	
DRILLER:	LOGGER:	START:	END:		LOCATION ON SITE: Behind Whittier School - south of soccer goal post		WELL/BORE DIA:	
Eckley	Noyce	8/7/91	8/7/91					
CASING DIA:	TYPE:	* CME - continuous 5 ft sampler			ROCK CORE:		ELEV.–TOC:	
					BIT TYPE:			
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.:		ELEV.–GROUND:	
					DRILLING FLUID USED:			

SAMPLE #	SAMPLE TYPE	RECOVERY TYPE	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
						0		Topsoil	PID - 0.0
1	*	100						Sand - very fine and silt	PID - 0.0
								Clay - firm, brown and gray mottled	PID - 0.0
						5		Clay - firm, brown and gray, mottled	
2	*	100							PID 0.0
						10			
								Clay - firm gray	PID 0.0
						15		EOH - No redox succession	
								hole sealed with cuttings and bentonite	

GEOLOGIC LOG

PROJECT NAME & LOCATION:							PAGE # OF	HOLE #
Cooper School – Westland								CE-14
COUNTY: Wayne	TOWNSHIP:	TOWN–RANGE: T2S-R9E	SECTION: 1	1/4	DRILL METHOD: HSA	SURFACE PROTECTION:	TOTAL DEPTH: 9.5 ft	
DRILLER: Eckley	LOGGER: Noyce	START: 8/7/91	END: 8/7/91		LOCATION ON SITE: Behind Whittier School – 27 ft N. of drain and 15 ft W. of old track curb		WELL/BORE DIA:	
CASING DIA:	TYPE: * CME – continuous 5 ft sampler				ROCK CORE: BIT TYPE:		ELEV.–TOC:	
SCREEN: TYPE/DIA:	LENGTH:	SLOT:			CORED HOLE DIA.: DRILLING FLUID USED:		ELEV.–GROUND:	

SAMPLE #	SAMPLE TYPE	RECOVERY TYPE	SAMPLE BLOWS	ELEV.	WELL CONST.	DEPTH (FEET B.G.L.)	GRAPHIC LITHOLOGY	LITHOLOGIC DESCRIPTION	FIELD TEST
						0		TOPSOIL	
								Sand – very fine, yellow brown, loamy, with brown clay lense	0.0 0.0
1	*	100						Sand – medium very [illegible] yellow	0.0 0.0
						5		Clay – firm yellow and brown mottled	0.0 0.0
								Clay – firm brown and gray mottled	0.0 0.0
2	*	100						Clay – firm, brown and gray mottled	0.0 0.0
						10		EOB Clay – firm, gray	
								Hole filled with cuttings and bentonite	